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The Beattie-Smith Lectures.[1]

(University of Melbourne.)

THE PSYCHOLOGICAL REACTIONS OF SOLDIERS.

By A. J. M. SINCLAIR,
Lieutenant-Colonel, Australian Army Medical Corps, Australia.

LECTURE I.

IN accepting the invitation of the University of Melbourne to deliver the Beattie-Smith lectures for 1944, I am acutely aware both of the honour conferred upon me and of the responsibility involved. My predecessors in this lectureship are psychiatrists whom I respect and admire. I claim equality with them in one respect only, and that is in my regard for a physician who, as long ago as the beginning of this century, saw as clearly as we see today the need for inquiry into the causation, early manifestations and treatment of mental disorder in its early stages.

William Beattie-Smith was an English physician, who came to this country in the latter part of last century. He worked as a psychiatrist in the Lunacy Department of Victoria for some years and later in a consultant capacity in this city (Melbourne). He practised medicine until within a few hours of his death. Throughout his career, he was regarded by colleagues who knew him well as a meticulous and patient worker with a high conception of the dignity of his profession. In these lectures we pay tribute both to his personal work as a psychiatrist and to his belief in the advancement of this branch of medicine.

A great deal of the material used in these lectures comes from my own personal experience; but I should like to say that this experience has been enriched by the guidance and encouragement of several of my seniors. The first of these was the late Lieutenant-Colonel Eric Cooper, with whom it was my privilege to work in Libya. Suffice it to say there is no man in military medicine to whom I owe more. In Palestine I learned the elements of effective military psychotherapy from Major Ralph Wishaw. Later in the same area I was fortunate to work under the command of Lieutenant-Colonel W. S. Dawson, Professor of Psychiatry in the University of Sydney.

The series of cases to which reference will be made as occurring in base hospitals in Australia come in the main from the work of a team of psychiatrists with whom I am now associated at an Australian general hospital.

Mass Conflict and Man.

During the past five years there has been ample opportunity for those interested in human mental reactions to examine the psychological effects of mass conflict on man. Every individual in the fighting forces has found himself suddenly thrust into a new social structure. He has been immersed in a constantly changing medium of personal experience which, because of its quality and magnitude, must of necessity modify the personality. As a corollary, he will have reacted to that experience in a manner peculiar to his own previous personality pattern. In order to fit in with the rapidly changing environmental situation that is peculiar to war, mental adjustments have often had to be made at an unusual rate because of the pressure of war. The soldier has had to integrate himself into a new and rapidly altering medium of experience. There has been no time for the comparatively slow process of mental adjustment which helps us to circumvent some of the difficulties of civilian existence.

None has passed through this experience unchanged. A great number have integrated themselves easily and unconcernedly into the new social pattern of war, and many indeed emerge from the experience the richer for it.

[1] Delivered at Melbourne on November 22 and 29, 1944.

Others have in greater or less degree failed to make the adjustment. To these men, war has been a traumatic experience of considerable magnitude. The latter represent the group of psychologically damaged individuals. Two factors go to determine whether or not a man will emerge psychologically damaged from the experience of war: firstly, his pre-war personality, and secondly, the quality of his individual experience during this period of service.

These lectures will deal with the various factors contributing to the development of psychological maladjustment in servicemen. They will, therefore, involve a consideration of that personality make-up which renders a man unsuitable for military life. They will deal with those elements in the war experience which may precipitate the normal or abnormal personality into a maladjustment or neurosis. Further, the lectures will include a description of the various manifestations of psychological disorder occurring amongst soldiers, with a consideration of the problems which they present in the war economy. Finally, the problem of so-called war neurosis will be considered in relation to the substantial question of post-war readjustment.

The personality of the soldier prior to his induction to the service is of paramount importance. It represents the equipment with which he deals with the hazards of the war situation, just as it was the equipment with which he had previously dealt with his pre-war environment. Failure in this respect in peace time presages almost certainly a failure in war time. In support of this, in a recent series of war neurotics examined, it was found that 40% of those men who broke down more or less readily when confronted with the environment of war, had personalities which could be assessed as defective, and that they had produced evidence in peace time of an inability to live in proper adjustment to their environment.

The Normal Personality.

It may be as well to indicate here some criteria of what is regarded as a normal personality. Weiss and English have described the normal personality as that occurring in an individual possessed of a satisfactory work capacity with a minimum of mental conflict, the ability to love someone other than himself, and the absence of symptoms of neurotic origin. They state that such a personality should exhibit the ability to reach a decision without too much stress or delay, and should enjoy work without undue fatigue and without the need for frequent change. They maintain that under these conditions one should show optimum efficiency, should take pleasure in social, marital and personal relationships, and should be capable of understanding the emotional needs of others and of making appropriate responses.

In my opinion, these criteria of the normal personality set a high standard of normality, and it is obvious that many men who have carried on satisfactorily in service would qualify only partially in respect of these criteria. It must be pointed out also that we are on rather controversial ground if we state that the standard of normal personality is measured by the ability to react correctly and adequately to the war situation, because this cannot be described even in general terms as a normal environmental situation. In this respect one has seen numbers of cases of neurotic breakdown develop among apparently well-integrated personalities whose first inadequacy relates solely to the situation of war. However, it may be said that adequate adjustment to the war situation, whether or not it involves overt aggression, demands the presence of a substantial number of the personality traits as described by Weiss and English.

The Development of the Personality.

To describe the development of the personality is a difficult task and not possible in the time available. Suffice it to say that the character development depends essentially upon the very early experiences of childhood. Even before we are subjected to these, there are hereditary, physical, racial and other constitutional factors, which, determined before birth, will help to decide whether or not the individual will be capable of adjusting himself to his environment. In the early formative years of life, the growing child absorbs a host of impressions and shows affective responses depending upon his constitutional make-up. Of prime importance at this stage of development is the relationship of the child to his mother and father. It is from this first and fundamental social relationship that the growing child develops his behaviour patterns. It is from these contacts with his parents that he first learns to love, hate and fear. This contact with his parents is his first experience in the complex business of interpersonal relationships, which will preoccupy him for the rest of his days. His personality will depend on whether he is the subject of parental over-love or under-love, and this will determine his reactions of affection or resentment, his dependence on others or his emotional integrity. It will influence his ability to accept authority or to deny it. His early training and the influence of parental example may give him persistence towards a goal, or on the other hand may teach him the tricks of avoiding an issue with his problems. As he follows his instinctual urge to become an individual, he may be thwarted, and this in turn will develop in him the early reactions and mechanisms of anxiety expression.

Therefore, it may be said that his relationship to his mother and father represents the beginning of experience and the beginning of environment, and as he grows he reacts to the increasing complexity of his environment with a pattern of behaviour which is determined by his past experiences, and which is varied and coloured by every further experience which he meets.

Types of Personality Likely to Fail under Service Conditions.

Let us now discuss the mental make-up of those men of whom it can be predicted with reasonable certainty that they will fail to make a proper adjustment in the field of military service.

In attempting to predict the types of personality likely to fail under stress of service, we may enumerate a few "certainties". The certainties include those individuals with significant mental defect, and also those who have inborn or constitutional character defects of more or less severe degree. Perhaps one should also mention those individuals who are the subjects of long-standing psychoneurotic reaction. It is almost certain that they, too, will respond to the service environment with a continuance or an exaggeration of their disability to the point of ineffectiveness. However, every now and again one meets a chronic psychoneurotic for whom the war fills some long-standing need—for example, the obsessive who finds the very job in which obsessional traits are an advantage, the hysteric who carries side by side with his flair of theatricalism, sufficient judgement, intelligence and insight to make him useful, or the individual with a chronic anxiety state which has resulted from an isolated, well-defined family maladjustment which he leaves behind when he joins the army. In spite of these exceptions, which are not the rule, one can say with a fair degree of certainty that the chronic psychoneurotic will be an almost certain liability to the army.

We shall deal with the mental defective and psychopath first.

Mental defectives have mental equipment of such functional level or capacity that they are unfitted to deal with the simple problems involved in any army occupation. The criteria of what is meant by mental defect are by no means fixed. It is quite possible for men of limited mental capacity or function to remain as useful citizens in civil existence, earning a quiet living in jobs well within their capabilities, in positions sheltered from the critical view of their fellows and from the harsh inquiry of open competition.

It is the opinion of psychologists who have studied the problem of placement in the army of these poorly endowed men, that a soldier with a mental age of less than eleven

and a half years is an uneconomic investment. Approximately 10% to 15% of all men offering for service in the forces fall below this level of intelligence and are now being weeded out, either on enlistment or at training centres.

If such men do happen to slip into the ranks of the army, it is found that they cannot assimilate the modern technical training for war. They are so handicapped in their relationships with their fellow-men by their intellectual and social limitations that they are not properly incorporated into the general scheme of army life. It is necessary to place such men in sheltered jobs where the full responsibility of military service is not imposed upon them. If, as so often happens, they are dislodged from this protected position by the unpredictable exigencies of war, they are bereft and aimless, and their handicaps quickly become apparent. If they do survive the critical days of the training period, they may become a liability in action. The cheerful butt of the battalion, who sinks inconspicuously into a more or less effective existence as a batman, excites little attention in a unit not in action. In action, however, he may become a batman-runner entrusted with important tasks. Under stress he is prone to panic reactions. His lack of judgement and defective comprehension make him unreliable. It is unsafe to entrust him with responsibility. Under even slight stress he is prone to develop neurotic or psychotic reactions. In short, he is a bad investment from the beginning. It will be seen later, when the various manifestations of psychological disorder of war are being considered, that some degree of mental defect operates as a significant factor in the psychogenesis of neurotic states.

Just as the mental defective is a liability in service, so also is the individual who possesses constitutional character weaknesses which have already shown him to be handicapped in civilian society. This is the constitutional psychopath. He is the occupational and social misfit. His weakness springs from a psychological immaturity that may be hereditary, constitutional, physical, biochemical or hormonal in origin for all we know. It may result from defective environmental conditions of early childhood. Some believe that it may result from early emotional conflicts of childhood and parental mismanagement. Whatever may be the cause, the affected individuals show ample evidence of long-standing defects of various kinds. They often have an unimpressive school and occupation record and have on previous occasions adjusted themselves to problems by sidestepping even the minor obstacles of normal existence. They are usually immature, inadequate men of poor emotional stability and of defective judgement. Their reaction to emotional influence is often excessive or uncontrolled. Their capacity for work is limited by their uneven energy and drive and by a general lowering of their threshold for fatigue. Their actions are often unpredictable and inconsistent. They may be shy, unsociable, intensely individualistic, queer or pseudo-intellectual. Some are over-sensitive and easily depressed. They may have a constant tendency to neurotic reactions which keep them in a state of chronic invalidism. On the other hand, they may be undisciplined, aggressive, irresponsible and unreasonable. In a grosser form, the psychopath may be a liar, thief, swindler or sexual pervert. It is scarcely necessary to say that men possessing any of the character traits mentioned in any marked degree will never make reliable soldiers. Unfortunately, they are usually the very men who are attracted to enlistment. An immature optimism leads them to grasp at military service, just as it has led them as civilians to turn from one failure to another.

The types I have described under the term "psychopath" represent clear-cut pictures of character weaknesses; but there is a larger group of men who may exhibit none of the above-mentioned traits in incapacitating or marked degree during the pre-service period, yet have a constitutional weakness in what we may call personality fibre. This weakness, although it may not prevent some period of useful service, sooner or later becomes apparent. Their character material is thinner and less well woven than that of their fellows, and their weakness becomes apparent slowly and in minor degree.

I wish to make it clear that these men do not necessarily break down because of developing neurotic elements. Rather do they break down because of a general or constitutional low level of emotional integration. This level has been sufficiently high to deal with most of the situations which confront the normal man in civil life, and also with a number of situations in the army. Such men may possess a sense of responsibility which fits them to fulfil a number of the requirements of a national ideal of service or a group ideal. They may have an energy flow sufficient to sustain them when it is reinforced by constant change, adventure, novel situations and excitement; but when the general tempo of war starts to flag and when the colourful picture seems to fade, these are the men who more quickly lose their ideals of service and their efficiency. They are the men who, after periods of service of sub-average or average standard, find that they are unable to maintain a uniform interest and application to the job on hand. I say that these men are not true neurotics, because if one carefully explores their past history, there is evidence that always they have shown some lack of emotional stability, some evidence of intermittent energy drive, and have previously modified their lives so that they might avoid the very stresses and strains which they are now no longer able to escape in war time.

The Effect of Environment.

Turning now to those men who may or may not break down in war service, we come to a consideration of two interdependent variables, the individual personality and the environment in which such a personality strives. We can no longer discuss one without the other. In considering the significant environmental factors, we must endeavour to appreciate the peculiar features of the social revolution which confronts the soldier on enlistment.

The initial element in this social revolution is the individual's entry into a world dominated by the authority principle. From the time he dons uniform, his daily life is regulated by the principle of submission. He must learn to submerge a good deal of his individuality and some of his spontaneity. His very attire is designed to mask any peculiar features and variations in the individual, and to impress upon him uniformity of purpose, impersonality and an acceptance of standards which are governed by rank and seniority. In this process of transformation from the individual to a unit of the fighting machine, there are problems of adjustment for each type of personality. The aggressive individualist may become hostile and rebellious, impatient of submission to authority. The man who has entered the service on a wave of a strong personal emotional urge, may feel submerged and frustrated; he may become apathetic and disinterested when he finds that war service represents a coordinated and not a personal act of aggression. Some men may bring with them well-ingrained attitudes of resentment towards authority. These attitudes, developed in early life as a reaction to parental domination, may have lain dormant during the young adult period, but are now strongly reactivated by a mechanism of identification in which army authority represents paternal or maternal domination in a new setting. Some men, by the very nature of their peace-time occupations, may be completely untrained in the recognition of the value of regimentation. Others accept authority with a grateful sigh, because their reaction pattern has always been one of submissiveness. Such men, however, may find in army routine an excuse for completely discarding any effort towards initiative or individuality in thought or action.

However, it may be said of the authority principle that most men accept it or adjust themselves to it satisfactorily. Indeed, numerous psychological advantages emerge from the experience of regimentation. There is a transition to the concept of the community goal as opposed to the previous goal of personal ambition. Irritating angles of personal idiosyncrasy are rubbed off, and self-effacing contours take their place, making community existence more harmonious and more productive.

Hand in hand with an acceptance of the authority principle is the loss of personal identity. This results from the experience of mass existence and service. To some extent self-esteem suffers, as does the capacity for individual mental functioning. The sheltering barricades of personal privacy are swept away, the individual being left with peculiarities and weaknesses exposed to the view of his fellows. He works, eats, sleeps, enjoys and suffers under the public gaze. He opens his bowels in a communal row. To the majority, this wholesale sharing of oneself presents no problem. To the shy, the seclusive, the sheltered and the introverted, it presents a difficult problem. To the inadequate man who was wont to weave his dreams in the comforting solitude of personal isolation, it is a painful awakening. In a society where there is little opportunity for the choice of one's bed-fellow, the jarring contact of incompatible personalities may lead to dissatisfaction and bitterness. For the hysteric, of course, community life may provide a stage and an audience much larger than that of his family circle, and for him there may seem to be no problems. The glamour of warfare attracts him, the plaudits of the crowd flatter him; but in the final analysis he may find his stage set with a realism too terrible for him to face.

Thus we see that psychological disorder may result either from the rejection of the authority principle, or from the stripping of the protective aspects of peace-time existence. There is another aspect of the social revolution of army life which has far-reaching implications. It is in this moral sense that war represents the necessity for a reorientation of values with an emphasis on aggression to the exclusion of cultural and intellectual goals. The individual whose personality is a complex of previous experiences, must weave rapidly into this pattern a vast new design of aggression, hatred and destruction.

Some men fail at the outset, and attempt to carry with them into the army ideals and moral values that are inconsistent and out of place. Unless such men are able to find in the army a niche which exhibits most of the features of civilian existence, they quickly fail. Other men accept the new standards only at the expense of repressing the old, and under stress they develop neurotic states which are a mixture of anxiety and depression with the emergence of guilt feelings.

The training period of the soldier contains many inherent features which may operate in producing boredom and disillusionment. The soldier may have enlisted in response to a realization of a national threat. His feelings at this time are those of non-specific dread associated with this threat. The resultant emotional reaction is a transient one. He enlists in a state of excitation. This feeling is fed by massive national propaganda which crystallizes the previous emotional attitude along various deliberately directed lines—patriotism, the threat to one's family, a duty to kill the invader and the lofty ideal of war to preserve freedom. Fighting is represented from the aspect of its intrinsic heroism, its suffering in nobility and its glory in righteous annihilation. The prospective soldier may be impressed by the colourful ritualism in the army. Perhaps he is aghast at the speed and immensity of the momentum of a nation gearing for war. He enlists. The training period usually results in a flattening of the emotional wave. There are often monotonous routine, exhausting training, discomfort. The daily round is one of repetition. The army organization in all its complexity appears to the soldier to be slowing up rather than speeding his impulse to realize his war ideal. He feels frustrated and fettered by what he calls "red tape". There seem to be delay, uncertainty and contradiction in the confusing scheme—a scheme of which he is only slightly cognizant. Often he feels that his own technical skills are not being utilized. He may be malposted, and fits uneasily into a round hole which will never suit his squareness.

There is a great tendency at this stage for the soldier to become apathetic, bored and resentful. It is at this time, when the glamour of his first emotional reactions is fading, that he becomes aware of the emotional isolation resulting from separation from home. This factor of separation and its resultant anxiety have been given a prominent place by some writers when discussing the psychogenesis of neurotic disorder in war time. It is a factor which certainly operates during the training period, but which during the more active phases of fighting seems to be thrust to the background of consciousness. Later, during the tedious days of regrouping, retraining and waiting between actions, it shows itself again as a potent factor in producing anxiety.

Separation of the soldier from his family often removes from him the prop upon which he has consciously or unconsciously leaned all his life. His personality, his emotional life, his habits, his ambitions, and in fact his main emotional and cultural medium, are withdrawn from him. When interpersonal relationships in his life are the cause of conflict or frustration, he may, of course, benefit from the release. When, however, his family dependence is an integral part of his mental equipment, he is bereft.

The sexual deprivation, which results from separation from home or from the presence of females, also plays a part in the formation of separation anxiety. Sex deprivation has effects that are various upon the soldier. To many, the loved object of sexual desire from which he is separated becomes the object of phantasy thinking. This phantasy thinking is more often based on selective memories than on realities. Moreover, these memories cannot move with the times. They are influenced by the content of a letter-to-letter relationship which stimulates or reinforces the phantasy picture that the soldier carries with him in his memory. The object of his phantasy thinking therefore becomes a composite, unreal picture of entirely pleasant memories. True, this may not effect psychological disorder at the time. However, it certainly does, when the letter-to-letter relationship breaks down or fails through repetition, or later, when the husband and wife confront one another in less colourful reality. The other possible effect of sexual deprivation is that the soldier may develop reversions to adolescent erotic attitudes based on phantasy thinking and characterized by increased interest in secondary sexual symbols. This exhibits itself in the increased interest in the secondary and subsidiary rather than the primary sexual characteristics of the female. There is an increased interest in photo magazines, in "pin-up" girls and in cinematographic representation of the secondary sexual characteristics. In a lesser form the sex interest is dispersed in an increased sentimentality. Maskin and Altman have pointed out that this sentimentality may show itself in the increased popularity of the so-called modern ballad, crammed as it is with sickly phantasy. They feel also that a masochistic theme may pervade these sentimental feelings, and they refer to such popular songs as "Don't Sit Under the Apple Tree with Anyone Else but Me", or "Somebody Else is Taking My Place".

Other evidence of sexual regression occurs in promiscuity, masturbation and homosexuality. Maskin and Altman point out that whilst these phenomena may represent a substitutive mechanism in many cases, there is a danger also that they may reactivate antecedant sexual anxieties and augment preexisting neurosis. Feelings of guilt associated with these anxieties may be projected on to the soldier's wife, and he will have doubts of her fidelity. He may express these doubts in letters in an attempt to reaffirm the sexual relationship which has been removed from him. The result is an increased state of anxiety and tension reinforced by feelings of doubt and domestic insecurity.

All these factors which we have been considering so far are related to the changed social relationships confronting the individual when he becomes a soldier. As Gillespie has pointed out, "the psychoneuroses are in the ultimate analysis, social disorders of the individuals". So we see that these factors, together with similar factors operating later in the soldier's career, are responsible for a large proportion of neurotic breakdowns. In my own experience of war neurotics, 40% to 50% have never been subjected to any battle stress, and therefore one can say with certainty that the breakdown of these men is due to disturbances of social relationships quite unrelated to the battle situation.

When we come to consider the battle situation, we are confronted with two possibilities in the psychogenesis of nervous illness. The first is the effect of the changed physical environment of the soldier in the front line and the second is the effect of actual combat. We enter, too, a field in psychogenesis which includes some popular misconceptions. These misconceptions concern chiefly the importance of physical factors in the causation of neurosis. What are these physical factors? In the first place the soldier's life is uncomfortable. He is often pushed beyond previous limits of physical exhaustion, in uncomfortable living conditions, on a diet which is monotonous and which may be inadequate quantitatively and qualitatively. There is not only a shortage of the necessities of life, such as food and water, but there is also exposure to vermin, filth and a host of unusual infections. The soldier is exposed to the effect of physical injury, ranging from the minor military traumata to the ghastly effects of heavy concussion and modern explosives. All this is granted; but do these factors in themselves play a significant part in producing neurosis?

Physical and Psychic Factors in the Production of Neurosis.

One view accepted during the last war held that nervous symptoms could and did occur as a result of organic brain changes produced by the concussive effects of explosives. Thus was coined the term "shell-shock", and although we commenced this war believing this theory to be fallacious, one still hears the diagnosis "bomb-blast" or simply "blast" as a label for a nervous disorder, the onset of which occurred during action. I should like to make it clear that there is no doubt that blast waves do cause cerebral damage, and can in all probability cause post-traumatic neurotic states. However, the number of cases in which this occurs is small, if we take as a reasonable criterion for a diagnosis of bomb-blast the presence of collateral evidence, such as damage to the skin, lungs and mucous membranes, or rupture of the ear drums. Among 207 psychiatric casualties from battle areas in Tobruk, such evidence was found in only eight cases.

The question of physical exhaustion in the ætiology of nervous disorder is important and confusing, because it is so often held by the patient or his relatives to be the causative factor. Moreover, subjective fatigue is a well-known symptom of neurotic disorder. In the New Guinea series of cases, 51% of the patients complained of exhaustion. In contrast with this, a true state of physical exhaustion was discoverable in only 9%. The estimate of what constitutes true physical exhaustion and a determination of its degree depend upon standards arbitrarily fixed by the observer, and full recognition is made of the existence of this personal factor. However, even when this factor is taken into account, in my opinion it is in relatively few cases that true exhaustion operates as a primary factor in the production of neurosis. I consider that it acts as a contributory factor by releasing neurotic anxiety which was already present but undeclared.

I believe that physical illness, such as malaria, dysentery or scrub typhus, may play a similar role, merely acting as the trigger which causes the developing neurotic to pass from a state of relative mental efficiency to mental incapacity. It was found in the New Guinea series that the percentage of psychiatric patients under treatment giving a history of recent physical illness was no higher than the expected sickness rate among normal troops at that time. This point seems to me to be worth emphasizing in relation to malaria, because it has been customary to describe cases of so-called malarial debility, in which the patients exhibit a picture of psychosomatic disorder that can usually be traced to emotional conflict based upon psychological maladjustment, and in which there is scant evidence to incriminate the plasmodium as the causal factor. In support of this, it may be mentioned that in spite of the fact that since the south-west Pacific campaign began, an enormous number of our troops have suffered infestation with the malarial parasite, yet there has not been a related rise in the incidence of neurotic disorder.

Finally, in the listing of what I consider to be the misconceptions regarding the psychogenesis of nervous illness, I must mention the belief that working and fighting in a tropical area carry with them an increased liability to neurotic disorder, the so-called tropical neurasthenia. To me, it would appear that in peace time this well-known tropical malady had its origin in boredom, underwork, and constriction of the intellectual, emotional and recreational aspects of life. Similarly in war time, the factors that operate do not depend, as is generally supposed, on the temperature or wet-bulb reading, but result from monotony, emotional isolation, unproductive activity and other psychological causes. One recalls that in the Middle East it was the glare of the desert and the dry heat that were held to be responsible for exactly the same symptom picture which is found in these cases of so-called tropical neurasthenia.

Factors are operative during action in the field, which of themselves are important in the psychogenesis of nervous disorder—factors which may operate significantly either in the normal or in the predisposed personality. The factor designated by the term "battle stress" contains many elements. The individual coming from a peaceful environment, where he may never have committed an overt act of aggression, is confronted with the actual business of fighting and killing to an accompaniment of the noise and frightfulness of present-day warfare which have no counterpart in peace time. First and foremost there is the constant threat of death, and more importantly, of mutilation. Whatever the personality of the individual, he becomes the victim of a mass of physiological fear reactions which operate universally in all animals, including man, towards the biological necessity of survival; but unlike his four-footed ancestors, he has the ability to reflect, to reason and to act in a premeditated way.

The neurotic state is, in general terms, a result of the conflict between the instinctual urges towards survival and the pursuit of a community goal.

The Soldier in Battle.

The soldier in battle is confronted with threats of awful magnitude. He becomes increasingly aware of the power of the threat as he sees his mates killed beside him, as he witnesses quick death and ghastly mutilation. The modern machinery of war is such that the threat is presented with all the evil character of impersonal omnipotence. The multiple rocket gun or the heavily armoured tank moving at high speed may be, to the soldier in its path, what the dragon is to the small boy. To some the threat assumes not an impersonal but a personal significance. The soldier feels that each diving aircraft is directed at him, that each bomb has his regimental number and his name inscribed upon it. Even if he has not this feeling, the soldier may develop a fatalism which arises from the contemplation of his mathematical chances of survival. The soldier who breaks down in fear, changes his attitude from "it can't happen to me" to "it will be my turn next".

The combatant gains tremendous help in the struggle to accept or counter this threat from the support given by the momentum arising from group fighting. He is enabled to identify himself with the strength of a mass personality, which, if it is well trained, is not subject to the fear reactions of the individual and which has a well-defined goal. It is only when this goal becomes indistinct in outline—or in other words, when unit morale is low—that the soldier may find he is not afforded sufficient support in his trial of strength. Of course, if the nature of the fighting becomes individual and not concerted, as it most often was in the New Guinea theatre, he is more prone to individual fear reactions.

It is clear, then, that the efficiency of a fighting group, and therefore of the individual, in withstanding the effects of stress, will depend on its cohesion, on its weapons and on the clarity with which its aggressive purpose is presented to each man. These are the important elements which contribute to the maintenance of morale.

The efficiency of the individual as a unit will partly depend on his psychological background. If he has poorly

resolved conflicts surrounding infantile attitudes of hostility and aggressiveness, with long-standing latent or manifest anxieties, these conflicts will be strongly reactivated in the battle situation. If an egocentric personality pattern has limited his sense of the importance of the national or group ideal, he will not be able to enjoy the protective influences of group fighting. In addition, as has been pointed out by Grinker and Spiegel, there may be a number of other internal factors which may cause a psychological breakdown. There is no doubt that different individuals possess varying constitutional thresholds for anxiety or fear. These may result from the early development of anxiety patterns in childhood, which may arise from psychological conflicts or as the after-effects of previous physical traumata. Thus, previous neurotic trends are seen to be of great importance. The passive, dependent type of individual appears to be particularly handicapped in this respect.

In addition, it would seem that men may be neurologically equipped in different ways to cope with the threats arising out of the battle situation. There is a sympatheticotonic type of individual whose autonomic system seems to react to anxiety stimuli more profoundly than that of his fellows. Whether this increased facility of certain reflex patterns of autonomic activity is the result of a particular type of neural make-up, or whether the individual develops the liability to heightened reflex response through the impact of previous experience, is not certain. The truth may lie in a combination of the two. In this connexion I quote Grinker and Spiegel:

> The hypothalamus is a central regulating apparatus which effects a coordination of responses, within the sympathetic nervous system and endocrines, which characterize emotional expression. It receives its afferent stimulation from the thalamus and cerebral cortex, directly or indirectly. More crude sensory impressions of pain and noxious odours, sounds and sights evoke purely diencephalic reflexes, which may be termed biological. They reverberate to the cortex, causing secondary feelings of anxiety. It is this reaction which probably is exercised for the first time at birth, as the organism passes from a parasitic existence into the world of impinging stimuli. The emergency birth effects are probably the prototype of later reactions. The hypothalamus also receives stimuli from the cerebral cortex, which are in the nature of requests for reactions of preparedness, based on cortical interpretations of dangerous environmental signals.
>
> The diencephalic mechanisms not only stimulate the peripheral sympathetic nervous system, but the cerebral cortex as well. Its driving effect has been well demonstrated. All these functions would be carried on to excessiveness, if there were no inhibitory processes. The cortex itself inhibits the hypothalamus; for when the cortex is removed from an experimental animal, it develops excessive and easily provoked "sham rage".
>
> According to this description, pathological states of anxiety may be due to disturbances of each or both components of the phasic diencephalic-cortical relationship. The cortex may be weakened by fatigue, physical stress, or other factors which we have discussed. This may increase its summons on the hypothalamus for emergency responses, or lessen its inhibition on that structure. The diencephalic mechanism may become excited to the extent that inhibitory mechanisms are too feeble to control it.

Summary.

Therefore, in summarizing the various factors which operate in the determination in a given individual of his particular type of reaction to the stress of battle, we may say that these factors are partly intrinsic and partly extrinsic. The intrinsic factors depend both on the neurological makeup and on the psychological constitution of the individual. The extrinsic factors include such variables as the effectiveness of the soldier's weapons, the spirit and momentum of the men about him, and the qualitative and quantitative elements of the strain imposed upon him.

It is with these assets and liabilities that he faces the primary and universal normal fear which comes to all men when confronted with the threat of death.

INTERVERTEBRAL DISK DISEASE: NEW SYNDROMES AND NEW CONCEPTS.[1]

By JAMES H. YOUNG, M.D. (Adelaide), M.R.A.C.P.,
Acting Honorary Physician to Out-Patients, Perth Hospital; Honorary Physician to Out-Patients, the Children's Hospital, Perth.

Part I: Low Back Pain and Sciatica.

MY ideas on the subject of low back pain are now radically different from those expressed in a paper[(1)] published two years ago. At that time I held orthodox views—views which were, of course, never based upon any proved physiological or pathological findings. In the past two years I have seen some 700 patients with these complaints; these include patients from my private practice, referred patients and hospital out-patients. I have been fortunate in that I have seen low back pain and sciatica, both traumatic and non-traumatic, in their early and late stages. In this part of my paper I shall attempt to introduce an entirely new attitude to the whole subject—an attitude based upon proven physiological and pathological findings, and, I think, upon sound logic.

In the clinical history one notes, amongst other things, the type of pain, which may belong to one of the following categories: (i) constant pain made worse by movement occurs in acute conditions; (ii) as the patient's condition improves, or in less acute cases, the pain comes on after the patient gets up and it grows worse with activity; (iii) pain coming on towards the end of the day occurs in chronic conditions; (iv) pain which wakes the patient from sleep or which is present on waking in the morning and which is relieved by getting up and walking about or by adopting certain positions is due to the posture during sleep.

The relationship of the pain to posture is significant. In mild bending and lifting injuries the pain is aggravated by sitting; this corresponds to the pain which is experienced on sitting flexion. In the common type of herniated disk, either with or without sciatica, when the lumbar portion of the spine is convex to the affected side, the pain is worse on standing (corresponding to the pain on extension) and on lying on the sound side or on the abdomen. When degeneration of a disk is present, the pain is worse on sitting or on getting up after sitting.

Radiation of pain to the lower portion of the abdomen or the groin and tenderness over Baer's so-called "sacro-iliac" point are usually due to involvement of the anterior part of a disk, and occasionally due to involvement of the twelfth dorsal or first lumbar nerves.

The investigation of these patients is orthopædic, neurological and radiological.

In the orthopædic examination I now omit the so-called lumbo-sacral joint test, as it is often performed without pain in the presence of obvious lumbo-sacral disease. I no longer perform a diagnostic manipulation, as it may be painful, one learns nothing from it, and I very much doubt whether the ilio-tibial band has anything to do with low back pain. Two years ago I did not examine flexion of the spine with the patient in the sitting position, because (i) I did not believe that this test helped to differentiate lumbo-sacral from a sacro-iliac strain when compared with the findings on flexion in the standing position, and (ii) I did not believe that shortening of the hamstrings ever caused backache. I did not say these things at the time, because it almost seemed heresy. Now I include a sitting flexion test in my examination, because it eliminates the tension on the nerve roots and the spinal *dura mater* which occurs with flexion in the standing position. When testing sitting flexion I sit behind the patient and grasp the iliac bones firmly to prevent flexion of the hips and to confine the movement to the spine.

[1] Based upon papers read at meetings of the Western Australian Branch of the British Medical Association on September 20 and October 18, 1944.

I believe that the posterior part of the intervertebral disk, the nerve roots and the interlaminar joints are the chief anatomical sites of the pathological processes which produce low back pain either with or without sciatica. Therefore, when carrying out any test on a patient, I ask myself what effect it has on these structures. Now the pivotal point around which movement occurs in the lumbar portion of the spine can be shown radiographically to be at the centre of the intervertebral disk. Thus, if one excludes structures which I have not mentioned: (i) standing flexion stretches the dura, the nerve roots and the posterior part of the disk; (ii) sitting flexion stretches only the posterior part of the disk; (iii) extension compresses the posterior part of the disk; (iv) lateral flexion compresses the disk on the same side and stretches the disk and the nerve root on the other; (v) rotation is not prevented by the interlaminar joints, as is often stated, but a strain is placed on them.

A special technique is necessary in the neurological examination. Flexion and extension of the hip and knee are tested with the patient in the sitting position, his legs hanging over the edge of the examination couch. The hips are flexed and extended against the resistance of the examiner's hand placed on or under the thigh. Flexion and extension of the knee are tested against the resistance of one hand, while the other holds the thigh down to confine the movement to the muscle being tested. The method of testing power in the feet and legs is that described by Bradford.[3] These muscles must be tested under weight-bearing. Springing briskly to the toe when standing on one foot reveals a slight weakness of plantar flexion of the ankle. Weakness of dorsiflexion is shown as toe slapping when the patient attempts to walk on his heels. Plantar flexion of the toes is tested by causing the patient to push his toes towards the floor when standing on his heels. Dorsiflexion is tested by causing the patient, whilst standing, to dorsiflex his toes as forcibly as possible. The toes are then depressed by pressure. There is no objection to the patient's holding to something to maintain balance during these tests. When present, muscular weakness is obvious, and equivocal changes are therefore ignored; but careful distinction must be made between true weakness and movement which is prevented by pain.

The ankle jerks should be tested with the patient kneeling if possible. If it is impracticable for the patient to kneel, then the ankle jerks are more easily elicited with the knee extended than flexed. The knee jerks may be reinforced by causing the patient to plantar-flex his toes.

It is very important to note that neurological signs may be present in the absence of root pains or other subjective sensory disturbances. They must therefore be looked for, even though there is nothing to suggest that they will be present.

Routine antero-posterior and lateral X-ray pictures are taken, the tube being at a distance from the patient to avoid distortion and centred over the suspected site. In the interpretation of the X-ray pictures, it should be noted that the lumbar disks increase in thickness from above downwards, except the fifth disk, which is the same thickness as the fourth or slightly thinner, the thickness being measured posteriorly. Sacralization of a transverse process is not a cause of low back pain; but it is important to realize that when this is present the fifth disk will be a thin vestigial structure.

Sciatica.

Let us first consider sciatica, for here at least we are dealing with a condition in which the site of the lesion can usually be inferred and often proved.

What is sciatica? In other words, what is the explanation of the distribution of the pain? On physiological and anatomical grounds there would appear to be five types of pain radiating from the back to the thigh and leg: (i) referred pain, (ii) pain arising in the nerve roots, (iii) pain arising in the lumbo-sacral trunk, (iv) pain arising in the lumbo-sacral plexus, (v) pain arising in the sciatic nerve. The last three types are all uncommon.

Referred pain may be segmental in distribution and may be accompanied by hyperæsthesia and hyperalgesia; but there are no other neurological signs. This type is not the common form of sciatica. The opinion of some investigators that sciatica is usually pain referred from a muscular or ligamentous lesion is evidently based upon inadequate methods of neurological examination.

The distribution and character of root pains in the lower limb needs clarification. We are accustomed to charts such as Figure I. Most such charts are based on those of Head,[4][5] who never claimed that his charts were accurate;

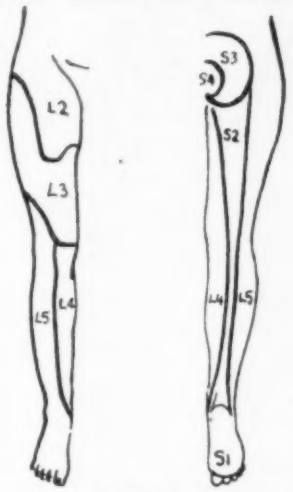

FIGURE I.
Dermatomes of the lower limb; old type of chart taken from "The British Encyclopædia of Medical Practice".

but, as he hoped, they approximate closely to the truth. It must be emphasized that such charts represent areas in which sensory changes are commonly found. Pain is felt in a more extensive area, and Figure II represents such segmental areas. This chart is based upon my own

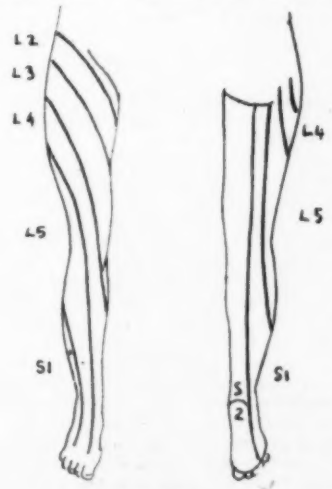

FIGURE II.
Dermatomes of the lower limb, new type of chart.

experience and agrees closely with that of Keegan,[6] who states that he can demonstrate sensory changes throughout the entire dermatome (some of his patients had divided nerve roots). I have found sensory changes up to the

lower border of the buttock at times, but not often. There is a large sensory overlap in the upper and outer portion of the buttock, all roots from the twelfth dorsal to the second sacral being concerned in the production of pain in this area. There is also some overlapping or variation in the toes.

The pain is not necessarily felt in the entire segment (though for brevity I shall subsequently describe it as being so felt). It may be felt in only part of it. Radicular pain is intensified by coughing, sneezing, straining and lifting. Eaton[2] thought this was due to increase in the size of the epidural space and stretching of the nerve roots. However, low back pain without a root pain is frequently made worse by these things, and I think this is due to the abnormal mobility in an affected disk. This can best be appreciated if a patient coughs or strains during a disk operation.

Root pains are often accompanied by sensory, motor or reflex loss. Sensory changes (tingling, numbness, and diminution or loss of sensation) occur especially in the lower parts of the dermatomes. This is contrary to the generally accepted view that sensory loss does not occur unless more than one nerve root is divided—a view which has incorrectly been attributed to Sherrington.[1] Loss of pain sense is usually greater than any loss of touch sense. Paræsthesia may occur on stroking.

The Second Lumbar Syndrome.—Pain radiates from the back to the upper third of the anterior part of the thigh. The cremaster reflex may be diminished and the lower abdominal reflex may not be obtained when the upper part of the thigh is scratched.

The Third Lumbar Syndrome.—Pain radiates to the anterior and antero-medial portions of the thigh and to the upper part of the medial section of the leg. There may be weakness of the quadriceps and diminution of the knee jerk. The cremaster reflex may not be obtained when the lower and inner part of the thigh is scratched.

The Fourth Lumbar Syndrome.—Pain radiates to the antero-lateral part of the thigh, to the front of the knee, to the antero-medial part of the leg, to the medial part of the foot, and sometimes to the great toe. In this syndrome weakness of the quadriceps and diminution of the knee jerks may also be present.

The Fifth Lumbar Syndrome.—Pain radiates to the lateral part of the thigh, to the antero-lateral part of the leg, to the dorsum of the foot and to the inner toes. Usually weakness of dorsiflexion of the toes is observed, especially of the great toe, and less often of the ankle. The ankle jerk is normal or diminished.

The First Sacral Syndrome.—Pain radiates to the postero-lateral part of the thigh, to the postero-lateral part of the leg, to the lateral aspect of the foot and to the outer toes. Plantar flexion of the ankle is usually weak and the ankle jerk is diminished or absent.

In the second sacral syndrome pain radiates to the postero-medial part of the thigh, to the postero-medial part of the leg, to the heel and to the sole. Plantar flexion of the toes may be weak and the plantar reflex difficult to elicit or absent. The *tensor fasciæ femoris* may not contract when the sole of the foot is scratched.

A root pain affecting the fifth lumbar or the first sacral root is the most common type of sciatic pain.

During 1944 I examined 141 patients suffering from low back pain with an associated pain in the lower limb, and of these 122 had radicular lesions. Table I shows the distribution of the lesions; it should be considered with Figure III, which shows the relationship of the extradural part of the nerve roots to the disks.

Three things should be noted. First, with one exception, only one or two nerve roots (usually only one) are involved, and each disk is in contact with the extradural portion of two nerve roots on each side. Secondly, there is no example of a lesion affecting both first sacral roots. This can easily occur if there are six lumbar vertebræ; but in the normal subject, if a lesion affects both first sacral roots, then the second sacral roots will almost certainly be affected as well. Thirdly, note the high frequency of double lesions of the second sacral root as compared with lesions of one second sacral root. These three points are all in agreement with the view that sciatica is usually discogenic in origin.

TABLE I.
Distribution of the Lesion in 122 Cases of Radicular Pain in the Lower Limb.

Roots Affected.	Number of Cases.	Bilateral Lesion.
1st lumbar	1	—
Second lumbar	2	1
Third lumbar	8	3
Fourth lumbar	8	1
Fifth lumbar	47	8
First sacral	37	—
Second sacral	5	4
Fourth and fifth lumbar	4	—
Fifth lumbar and first sacral	4	—
Fifth lumbar, first and second sacral	1	1
First and second sacral	5	4
Total	122	—

As sciatica is usually an affection of one nerve root, the causative lesion must be placed in the intervertebral disk, in the interlaminar joint or in the vertebræ, and as radiological evidence of disease of the two last-mentioned is uncommon, one must largely agree with Dandy,[3][9][10] who regards sciatica in 95% of cases as being due to a lesion of the disk. This statement must not be misinterpreted. I do not consider that sciatica is usually due to a herniation of the disk. In other words, I draw a careful distinction between disk disease and disk herniation. Dandy describes two forms of disk abnormality: (i) concealed rupture of the disk, which causes pain because the disk becomes adherent to the nerve root; Dandy's choice of the word "rupture" is unfortunate, as it implies a traumatic origin or an actual tear, neither of which may be present; I think that "degeneration of the disk" is a more accurate term; (ii) herniated disk, which causes pain by pressure on the root.

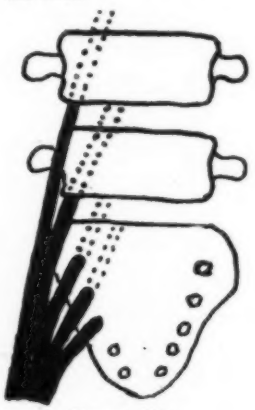

FIGURE III.

Dandy's work is of great value, in that he has demonstrated the common pathological lesions in sciatica; but I cannot agree with him on two points. First, I do not think that degenerated disks always require operation. Secondly, Dandy states that the symptoms of the "concealed ruptures" are precisely like those of the herniated disk. On the contrary, I believe that the discogenic sciaticas can be divided into several clinical types, each with distinctive signs and each requiring, perhaps, different treatment. The neurological signs are identical in all types, though they vary in degree. The types are distinguished by the orthopædic signs. This statement implies that various types of disk disease can be diagnosed in the absence of a root pain, and this I know is possible.

Herniation of a Lumbar Intervertebral Disk Associated with Sciatica.

Let me now describe the signs, and the mechanism of their production, in a patient with sciatica due to a herniated disk, for we shall learn a great deal about the interpretation of clinical signs from this patient.

The patient is examined stripped and standing. The lumbar part of the spine is flattened or flexed forward and is usually flexed away from the painful side[1] (Figure IV).

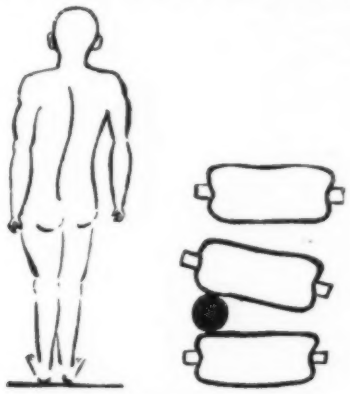

FIGURE IV.

The lateral flexion deformity may not be marked when the patient is in the erect position, but may become more obvious when his spine is flexed or extended. It may then be noticed that he deviates away from the painful side. These flexion and lateral flexion deformities are not primarily due to muscular spasm, as is so often stated, for they may persist under anæsthesia, and further, there is no muscle which will produce the localized deformities that sometimes occur. These deformities are due to the protrusion of a piece of disk which prevents the vertebræ from being extended or flexed to the affected side.

The reaction to movements is not well described in the literature. Standing flexion (Figure V) is painful, while

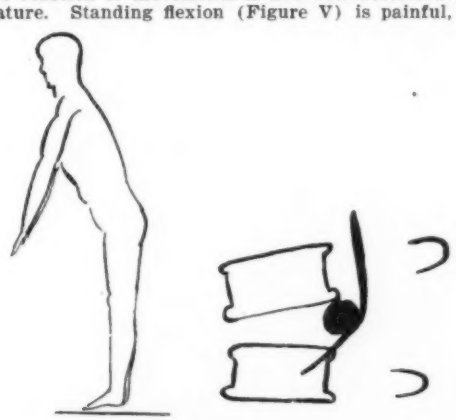

FIGURE V.

sitting flexion (Figure VI) may be painless or only slightly painful. Flexion may allow the protrusion of the disk partially to reduce itself, thus lessening pressure on the nerve root in the sitting position. In the standing position, however, the partial reduction of the protrusion from the flexion does not compensate the tension placed on the nerve roots via the sciatic nerves. Extension (Figure VII) is painful because it squeezes the protruded disk, making it herniate further and compress the nerve root more. Fexion to the painful side (Figure VIII) likewise squeezes the protruded disk and causes pain. Flexion to the sound side (Figure IX) is painless for the opposite reason.

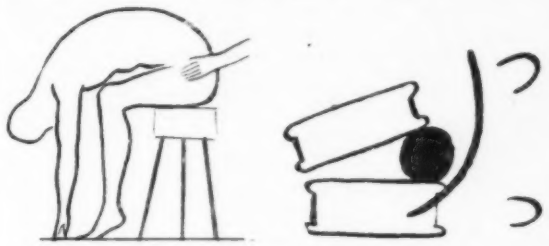

FIGURE VI.

I should like to impress these signs on you, and would ask you to remember the following syndrome: pain on standing flexion, pain on extension, pain on flexion to the affected side, absence of pain on sitting flexion, absence of pain on flexion to the sound side, and deformity—either

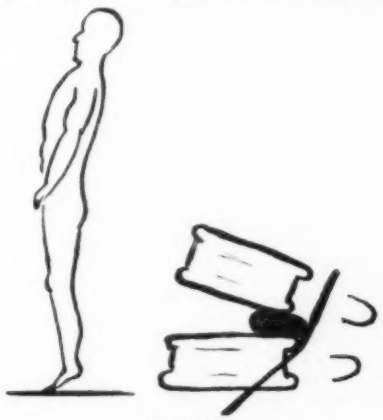

FIGURE VII.

forward flexion, or flexion to the sound side, or both. As these signs are due to compression of the protruded disk or the nerve root, I call this the "compression syndrome".

The patient is now examined lying face down. As extension is painful, he may require a pillow under his

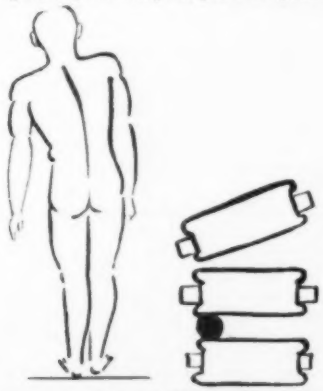

FIGURE VIII.

abdomen in order to be comfortable. This is an excellent method of obtaining muscular relaxation in any case of low back pain, and it has the advantage of opening up the lumbar spaces and making the localization of a tender

[1] I shall not discuss those cases with an alternating scoliosis, nor those in which the spine is flexed to the affected side. Neither shall I discuss herniations of the upper three lumbar disks.

point more accurate. There is a localized tender spot on firm pressure over the affected lumbar intervertebral space, or just to the affected side of it, or in both positions. Pressure or percussion over this spot may reproduce the pain or paræsthesia of which the patient complains. Tenderness may also be present over the sciatic nerve. It is noteworthy that in proven cases of herniated disk, fibrositic nodules may be present in the glutei. For some time I have regarded these lesions as secondary phenomena. I do not deny that they may produce and perpetuate symptoms and may therefore require treatment, but I seldom diagnose primary fibrositis now. But of this I shall say more later.

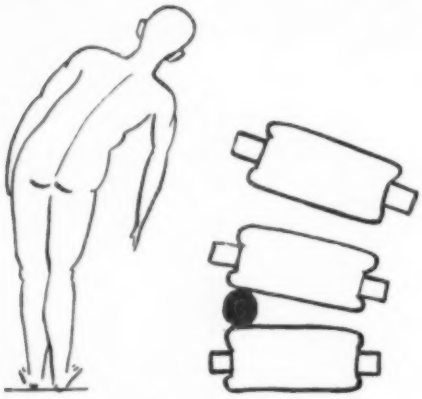

FIGURE IX.

The patient is next turned on his back, and straight leg raising and sciatic stretching are performed. On the affected side these movements stretch the nerve root over the disk, reproducing the pain. On the sound side they stretch the nerve roots and pull the dura across, thus stretching the affected root over the disk. The pain is again reproduced, but for obvious reasons a greater degree of straight leg raising than on the affected side is required. Pain may be felt when the legs are let down suddenly after straight leg raising, because the sudden extension of the spine squeezes the disk. Neck flexion pulls the dura upwards and may stretch the nerve root, causing pain. This test is more sensitive if combined with straight leg raising.

The neurological signs are of value only in localizing the lesion. The diagnosis of a herniated disk, as distinct from a torn or degenerated disk, is made on the combination of signs which I have called the compression syndrome.

In some cases of this condition the herniation of the disk apparently reduces itself spontaneously, and relief is experienced. The rate of recurrence is high, but recurrence is not invariable. If spontaneous reduction occurs, the patient should wear a support and avoid bending and lifting; but I do not wait for spontaneous reduction in the hope of avoiding surgical intervention.

Herniation of a Lumbar Intervertebral Disk without a Root Pain.

In herniated disk the sciatica is often for a long time preceded by low back pain. The backache disappears after operation if the disk is completely removed. It is, therefore, reasonable to assume that the backache was due to disk disease, and it should be possible to make the diagnosis before sciatica occurs. Dandy[11] has operated in twenty such cases. He does not state whether they were herniated or degenerated disks, and he describes no clinical signs. He finds thinning of the disk in the X-ray film in over 50%. My cases have shorter histories, and I have noted additional X-ray signs. The diagnosis can be made clinically without the involvement of a nerve root and without X-ray help.

After injury, perhaps repeated, or exposure to cold or damp, or for no obvious reason, an acute, intermittent or chronic low back pain occurs. This may be central or more to one side and may radiate to the buttock. It is worse on standing, and may be worse on coughing or on neck flexion. A localized tender spot is found on firm pressure over one lumbar intervertebral space, and those signs which I have already described as the compression syndrome are present. There may be pain on letting go suddenly after straight leg raising.

In some cases the pain is central, the lumbar portion of the spine is flattened or flexed forward, extension is painful and lateral flexion is unaffected. In others the pain is more to one side, there is a lateral flexion deformity convex to the affected side, extension is painless, but lateral flexion to the affected side is painful (Figure X). At times a lateral flexion deformity may not be pronounced when the patient is in the standing position, but may become more obvious on flexion or extension.

FIGURE X.

Herniation of the fourth lumbar disk causing low back pain without any root pain and proved surgically. Photograph taken three days after injury. There is a lateral flexion deformity convex to the right.

These flexion and lateral flexion deformities are not primarily due to muscular spasm for reasons already stated. I am certain that these deformities, when associated with a localized tender spot over one intervertebral space and with pain on attempting to correct the deformity, almost always indicate disk herniation.

I have several times noted these types of low back pain in patients who have subsequently suffered from a root pain, and I believe that the lesion is a herniated disk in which the sensory nerve roots are not involved. If such patients are examined carefully, muscular weakness and reflex changes will occasionally be found. I have noted a diminished knee jerk, a diminished ankle jerk, weakness of dorsiflexion of one or both great toes, and tremors in the lower limbs produced by extension of the spine.

The radiograph may reveal a flexion or lateral flexion deformity (Figures XI and XII), thinning of a disk, or subluxation of one vertebra backwards or laterally on the next lower vertebra. In the past this type of condition has often been diagnosed as a sacro-iliac strain or subluxation.

Table II, based on patients seen in the last half of 1944, gives some idea of the frequency of these types of low back pain.

Spontaneous reduction of the herniation may occur; but in the majority of these cases the prognosis is as bad as in those of sciatica due to the same cause unless it is treated surgically.

TABLE II.
Incidence of Compression Syndrome in Patients with Low Back Pain.

Symptomatology.	Number in Private Practice.	Number of Referred Patients.
Low back pain only	41	39
Low back pain with compression syndrome	6	10
Low back pain with radiation to the buttock	5	5
Low back pain with compression syndrome	3	2

Seven patients of this type (six traumatic) have now been operated on; in these the lateral flexion deformities were found to be due to a partly detached and herniated piece of disk preventing flexion to the affected side in much the same way as a damaged meniscus causes locking of a knee. The affected disk is localized by the tenderness, by the radiographic signs, if any, and by the abnormal mobility between the affected vertebræ.

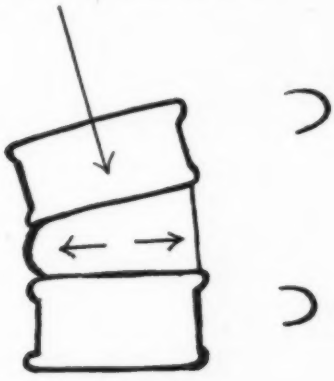

FIGURE XIII.

Bending and Lifting Injuries.

Disk degeneration and herniation are often preceded by bending and lifting injuries, and Dr. Clark has operated on a patient with a torn disk six days after injury. These strains therefore do damage the disk, and I believe that one is justified in assuming that disk injury is the common result of such strains.

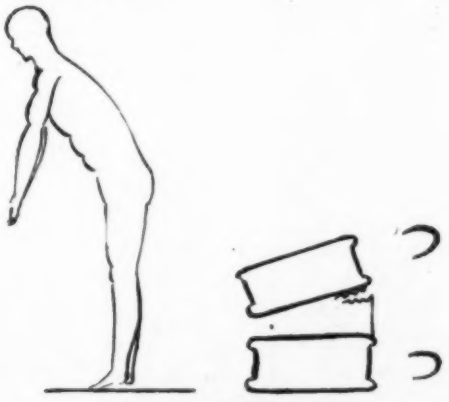

FIGURE XIV.

In the flexed position the sacrospinales, the interspinous ligament, the posterior common ligament, and the posterior part of the disk are all stretched. (The intertransverse ligaments and the *ligamenta subflava* are relaxed, for they will still permit lateral bending in the flexed position.) When the actual lift commences, (i) these structures are all subjected to a sudden additional stretch, which may tear them, and (ii) the weight of the article lifted must be transmitted to the ground via the spine. This compresses the disks, and as has been shown by Barr,[13] they bulge at their periphery. The annulus is thus subjected to a sudden force acting from within outwards (Figure XIII). The anterior common ligament is strong, and supports the whole width of the anterior part of the annulus. The posterior common ligament is weak, and supports only the central portion of the posterior part of the annulus. Thus the attachments of the posterior part of the disk may be damaged.

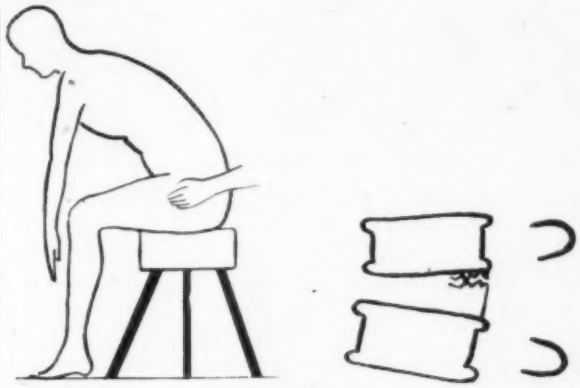

FIGURE XV.

A careful analysis of the signs leads one to the conclusion that bending and lifting injuries do not commonly tear the sacrospinales and only rarely tear the interspinous ligament. In fact, when the sacrospinales are extensively detached from the vertebræ in a disk operation, the resulting disability is surprisingly small. Injury to the posterior common ligament could hardly produce any lasting disability (it is in fact often a vestigial structure), so it does seem likely that these injuries commonly damage the disk.

In patients with the less severe grades of bending and lifting injury, the signs are tenderness over one lumbar intervertebral space or slightly to one side, pain on standing and sitting flexion and no pain on extension (Figures XIV to XVI). In those patients whose pain is

FIGURE XVI.

slightly to one side of the mid-line, one may notice, on inspection of the patient in the standing position, that the spine may be flexed towards the affected side. Pain is then felt on flexion to the sound side, and no pain on flexion to the affected side. This combination of signs is

well explained by the assumption that the pain is produced by the stretching of a small tear in the attachment of the disk. I therefore call this the "stretch syndrome", and I shall repeat the signs: pain on standing and sitting flexion, pain on flexion to the sound side, painless extension and painless flexion to the affected side.

The hypothesis that this injury produces a tear in the attachment in the posterior part of the disk depends upon (i) theoretical considerations, (ii) analysis of the signs, (iii) the knowledge that sciatica may accompany or follow this condition, and (iv) the knowledge that this condition may progress to a more severe grade of signs (*quod vide*), which we now know may be due to a herniation of the disk.

This injury is usually not well treated. If a patient has a sprained external ligament of an ankle, we strap the ankle in a position of eversion. Similarly, the only reasonable method of treating the injury under discussion is to hyperextend the spine. This can be accomplished by rest on fracture boards with a small pillow under the lumbar part of the spine, or by a spinal brace. Injection of a tender sacrospinalis with a local anæsthetic may abolish a protective muscular spasm and lead to further damage. Flexion exercises are contraindicated during recovery, though they are usually prescribed.

In the more severe grades of this injury, the signs are those already described as the compression syndrome, and, as has been mentioned under that section, in six of my cases torn disks have been found at operation, in one case six days after injury. In these cases a lateral flexion deformity was produced by a detached and herniated piece of disk, and this I believe to be the usual lesion in such cases.

Sciatica as an Immediate Result of a Bending and Lifting Injury.—I have seen sciatic pain occur at the time of an injury and from sneezing in patients who have never had a backache in their lives. Neurological signs have been present. The orthopædic signs are those just described as the stretch syndrome, and the treatment is similar.

Degeneration of a Lumbar Intervertebral Disk with or without a Root Pain.

There is a common type of low back pain (with or without a root pain) in which the signs suggest that all movements of a disk are painful. It is convenient to refer to this type as a mixed syndrome, as the signs sometimes seem to be due to a stretching of the disk, sometimes to compression of the disk, or both. At operation a degenerated disk is found. Among many such cases proved at operation, I have had four patients who had low back pain without any accompanying pain in the leg. This is the most common type of chronic low back pain, and in the past has been diagnosed as chronic lumbo-sacral strain, lumbo-sacral arthritis, spondylitis, postural backache and adhesions.

There is the usual tender spot over the affected intervertebral space or just to one side. The interspinous ligament over the affected disk may be slackened and palpable as a depression instead of as a firm ridge (Radcliffe-Taylor's sign). Sometimes extension of the spine is more painful than flexion (suggesting a compression phenomenon); sometimes the reverse is the case. Lateral flexion may cause pain on the side towards which the patient flexes his spine (compression) or on the opposite side (stretch type). Minor lateral flexion deformities may occur (Figure XVII); but major deformities do not. The radiograph may reveal thinning of the disk or subluxation of one vertebra on the next.

The nerve root may become adherent to the disk. Osteophytes may be formed at the disk margins, and if they lie in the intervertebral foramen they may irritate the nerve root. If the nerve root is involved, a root pain, or neurological signs, or both, may be present.

Treatment depends upon the symptoms. If only low back pain is present, a support is tried first. This may relieve the pain while nature effects a cure by shortening the surrounding ligaments. The type of support used depends upon which disk is affected. If there is a root pain, an epidural injection followed by a support is rational treatment. If conservative treatment fails, removal of the disk is advised. The disk is localized by the tenderness, by the radiographic signs if any, and by the abnormal mobility. A specially bent dissector is used to remove the annulus on the side opposite to that on which the operation is done, and a side-cutting burr to remove the cartilage plates from the adjacent surfaces of the vertebræ, thus exposing bare bone and blood vessels in order to obtain an ankylosis. If a nerve root is obviously being irritated by osteophytes, the neural foramen is uncapped.

FIGURE XVII.

Degeneration of the fifth lumbar disk; clinical diagnosis with supporting radiological evidence and similar to that in other proved cases. When the patient stood upright there was no deformity of the spine. The patient has been photographed in full extension and a lateral flexion deformity has become apparent.

Acute Lumbago and Acute Sciatica.

Acute lumbago and acute sciatica occur occasionally in private practice; such patients seldom reach the specialist, as they tend to recover quickly. Some cases appear to follow exposure to cold or damp, others follow acute infections. The signs are similar to those just described as occurring in degeneration of a disk—namely, localized tenderness and a mixed syndrome. The only difference between the two conditions is the acuteness of one and the chronicity of the other. The similarity of the signs suggests that the disk is affected—a view that is strengthened by the knowledge that disk degeneration and herniation are occasional sequelæ.

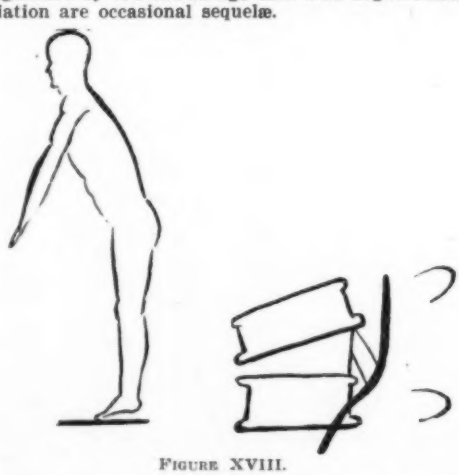

FIGURE XVIII.

Treatment is by rest in slight flexion with the adoption of the extended position as soon as it is tolerated. Weight extension may help. Flexion exercises are contraindicated during recovery. Epidural injection is sometimes of help in subsiding acute sciatica.

Sciatica and Epidural Injection.

Epidural injection can be shown radiographically to compress the dura. It may cure sciatica by breaking down adhesions between the nerve root and the disk.

The type of patient who is likely to benefit from this treatment has a history of long, continuous sciatica. Tenderness over a lumbar intervertebral space is uncommon. Standing flexion (Figure XVIII) is painful, and pain may be felt on flexion to the sound side. Sitting flexion (Figure XIX), extension (Figure XX) and flexion to the

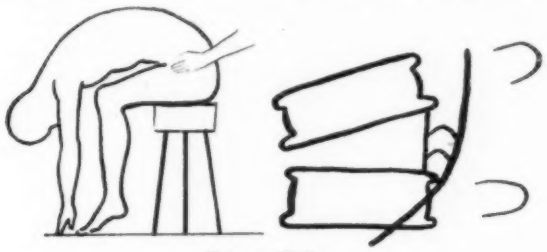

FIGURE XIX.

affected side are painless. The signs may be explained by stretching adhesions between the nerve root and the disk. Neurological signs are not common.

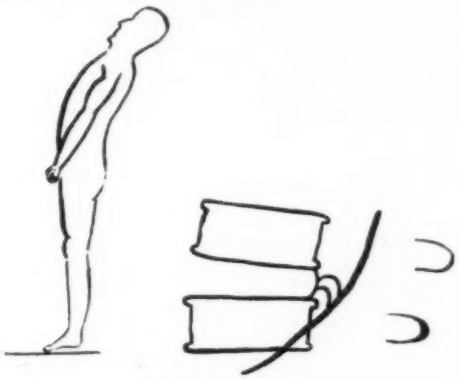

FIGURE XX.

Epidural injection is also of value in degeneration of a disk and in subsiding acute sciatica.

Summary.

The accompanying scheme (Figure XXI) shows the relationship of the various types of low back pain described in this paper, and will explain, I think, much that has previously been obscure.

Root pain, sensory loss, motor weakness or reflex changes may be added to any of the above syndromes; but they are not necessary either for the diagnosis of disk disease or for the localization of the affected disk.

Table III shows the causes of low back pain with an associated pain in the lower limb in 141 cases recorded during 1944.

TABLE III.

Causes of Low Back Pain with an Associated Pain in the Lower Extremity in 141 Cases.

Type of Pain.	Number of Cases.
Radicular pain:	
Discogenic:	
Torn attachments	4
Acute sciatica	7
Degenerated disk	48
Herniated disk	45
Adhesions	11
Interlaminar arthritis	4
Metastatic carcinoma	1
Post-traumatic sequestrum	1
Trauma to a nerve root	1
Referred pain:	
"Sacro-iliac subluxation"	1
Sacro-iliac arthritis	1
Arthritis of the hip	1
Endometriosis	1
Contusion of the sciatic nerve	1
Irritation of the sciatic nerve by scar tissue	1
Unclassified	13
Total	141

Part II: Stiff Neck and Cervico-Brachial Neuritis.

The subject of stiff neck and cervico-brachial neuritis has much in common with that of low back pain and sciatica. In the clinical history one notes the same types of pain as in the lumbar region, and they have the same significance—that is, constant pain, pain occurring with activity, pain occurring towards the end of the day, and pain which wakes the patient from sleep. The investigation is orthopædic, neurological and radiological.

The patient is stripped to the waist and first examined in the sitting position. The posture of the head and shoulders is noted and muscular spasm is observed. Movements of the neck are tested systematically, and one notes any resulting pain, its site, any limitation of movement, and any grating which the patient may feel. Flexion stretches the posterior part of the disk, the dura and the nerve roots. Extension compresses the posterior part of the disk. Lateral flexion compresses the disk on the same side and stretches the disk and the nerve root on the other. The neck is flexed forwards, pressure is applied to each spinous process and any tenderness is noted.

The patient now lies face down on the examining couch, the forehead resting on the hands. The neck and upper shoulder girdle muscles are carefully palpated. The arms are then placed by the sides while the lower shoulder girdle muscles are examined.

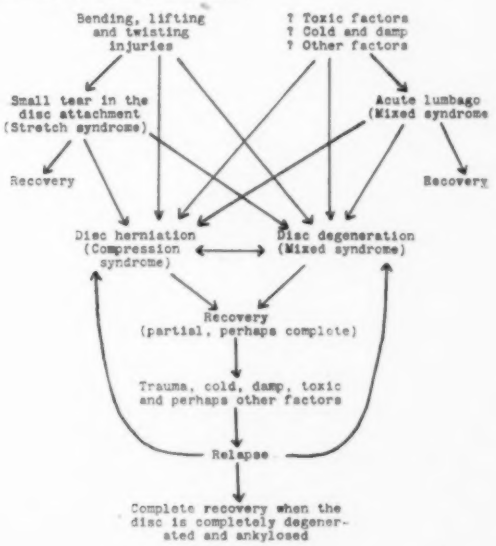
Bending, lifting and twisting injuries
? Toxic factors
? Cold and damp
? Other factors
Small tear in the disc attachment (Stretch syndrome)
Acute lumbago (Mixed syndrome)
Recovery
Recovery
Disc herniation (Compression syndrome)
Disc degeneration (Mixed syndrome)
Recovery (partial, perhaps complete)
Trauma, cold, damp, toxic and perhaps other factors
Relapse
Complete recovery when the disc is completely degenerated and ankylosed

FIGURE XXI.

A special technique is necessary in the neurological examination to demonstrate the slight motor and reflex changes which may be present. The pupils are examined, Horner's syndrome is looked for, and the upper limbs are inspected for wasting.

Abduction and adduction of the shoulder are tested whilst the examiner stands behind the patient. The patient then sits up to a table and is instructed to keep his elbows on the table while flexion and extension of the elbows are

tested. Keeping the elbows on the table prevents the use of other muscles during the test—for example, the use of the depressors of the shoulder at the same time as the extensors of the elbow. The forearms or the hands are kept down on the table while flexion and extension of the wrist, thumb and fingers are tested. Abduction of the thumb and little finger are tested against the resistance of the examiner's index fingers. Adduction of the thumb and fingers is tested with a piece of paper, which the examiner holds by adducting his right thumb to his index finger. The patient grasps the other end of the paper in the same manner with his right thumb and index and attempts to pull it away from the examiner. The same test is carried out between the index and middle, middle and ring, and ring and little fingers. Then the patient's left hand is tested against the examiner's left. If there is any weakness, the examiner will pull the paper away from the patient with ease. Opposition of the thumb is tested by holding the paper between the tips of the thumb and index finger.

The reflexes are tested with the patient sitting on a chair, the forearms resting on a pillow placed on the lap. In this way one obtains that complete relaxation which is necessary to facilitate the production of reflexes. In this position it is often easy to elicit a deltoid reflex, and it is not difficult to compare the reflexes of the two sides. The deltoid, biceps, supinator, triceps, radial and Mayer's thumb reflexes are tested.

Three X-ray views of the cervical part of the spine are taken as a routine measure—one antero-posterior view, one lateral view with the neck in its normal upright position, and one lateral view with the neck flexed.

Cervico-Brachial Pain.

On physiological and anatomical grounds there appear to be four types of pain radiating from the neck to the upper limb:

1. Referred pain. As in the lower limb, this may be of segmental distribution and may be accompanied by hyperæsthesia and hyperalgesia. It is perhaps more common in the upper limb than in the lower limb, but referred pain is not the common type of brachial neuritis.

2. Pain arising in the nerve roots. These root pains are often accompanied by sensory, and sometimes by motor and reflex loss. This is the common type of brachial neuritis.

3. Pain arising in the brachial plexus—for example, the cervical rib syndrome.

4. Pain arising in the brachial nerves. I have not seen an example of this type of pain.

In the last year I have examined 84 patients with cervico-brachial pain. The site of the lesion in these patients is shown in Table IV. It is noteworthy that in 55 of these cases the condition is due to lesions of one nerve root. It is, therefore, apparent that cervico-brachial pain is often due to a lesion of the intervertebral disk, the interlaminar joint or the vertebræ, and as radiological evidence of disease of the two last-mentioned is uncommon, one must admit the important role played by the disk in the pathogenesis of cervico-brachial pain. In actual fact there is often radiological evidence of disk disease, as Table IV shows.

TABLE IV.

Site of the Lesion in 84 Cases of Cervico-Brachial Pain.

Affected Root or Type of Pain.	Number of Cases.	X-ray Evidence of Disk Disease.	Operative or Post-mortem Proof.
Third cervical[1]	1	1	1
Fifth cervical	3	1	1
Sixth cervical	21	21	2
Seventh cervical	24	13	1
Eighth cervical	5	2	—
First dorsal	2	—	—
Sixth and seventh cervical	5	5	—
Seventh and eighth cervical	1	1	—
Cervical rib syndrome	1	—	—
Referred pain from arthritis of the shoulder	7	—	—
Unclassified	14	—	—
Total	84	—	—

[1] This is not a case of cervico-brachial pain, but is included here for convenience.

Spurling and Scoville,[12] Ulmer and Meredith,[14] and Michelsen and Mixter,[13] have described the syndromes of compression of the sixth, seventh and eighth cervical roots resulting from herniation of the corresponding disks. In addition to these, I have proved examples of compression of the third and fifth cervical roots.

Just as the study of cases of herniated lumbar disk has made us realize that the dermatome charts of the lower limb had to be revised, so it is already apparent that the dermatome charts of the upper limb also need revision. Figure XXII shows the type of chart we are accustomed

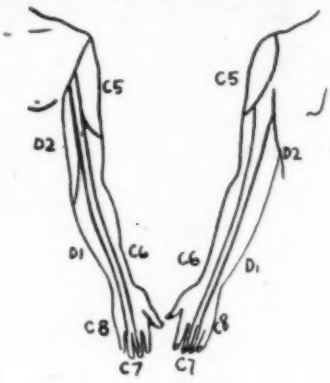

FIGURE XXII.

Dermatomes of the upper limb; old type of chart taken from "The British Encyclopædia of Medical Practice".

to use. Figure XXIII represents the probable dermatomes in the upper limb. It may require revision with further experience. This chart is based upon the combined experience of the above-mentioned authors and myself. There is a considerable degree of variation or of overlapping of the segmental areas in the fingers. A variation of one digit in either direction is common. This variation probably depends upon whether the brachial plexus is prefixed or postfixed.

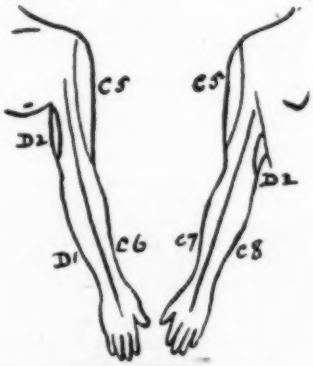

FIGURE XXIII.

Dermatomes of the upper limb; new type type of chart.

I shall describe the pain of each radicular syndrome as involving the whole segment, though it may only involve part of it. Sensory disturbances occur especially in the lower parts of the dermatomes. Motor and reflex changes are less common than sensory phenomena. There are variations and overlapping in the segmental innervation of the muscles (for example, the biceps may be involved in

ILLUSTRATIONS TO THE ARTICLE BY DR. JAMES H. YOUNG.

FIGURE XI.

Proved herniation of the second lumbar disk. There is a forward flexion deformity between the second and third lumbar vertebræ.

FIGURE XII.

Low back pain without root pain, due to a torn (herniated) disk, proved surgically. There is a lateral flexion deformity between the fourth and fifth vertebræ.

FIGURE XXX.

Proved degeneration of the fourth cervical disk with compression of the fifth cervical root. The view taken with the neck extended shows no abnormality.

FIGURE XXXI.

The same patient as in Figure XXX. The view taken with the neck flexed reveals a flexion deformity due to abnormal mobility between the fourth and fifth vertebræ. At operation the disk was completely degenerated, and the fourth vertebra had subluxated forward on the fifth, causing compression of the nerve root in its foramen.

ILLUSTRATIONS TO THE ARTICLE BY Dr. JAMES H. YOUNG.

Figure XXXII.
Proved herniation of the sixth cervical disk. There is a flexion deformity between the sixth and seventh vertebræ.

Figure XXXIII.
Chronic scapular fibrositis. The view taken with the neck flexed reveals a flexion deformity between the fifth and sixth vertebræ. The upright view revealed no abnormality.

Figure XXXIV.
Chronic neck pain. This film, taken three months after injury, reveals thinning of the sixth disk.

Figure XXXV.
The same patient as in Figure XXXIV. The film taken three years later reveals osteophytic outgrowths ("spondylitis").

the seventh cervical syndrome); but these variations will not be mentioned in the descriptions which follow.

The Third Cervical Syndrome.—Diagnosis in the third cervical syndrome was proved by contrast myelography during life and confirmed at autopsy. (This is the only time I have used myelography in the past two years, except in suspected spinal tumours.) The signs provide one of the most fascinating examples of applied anatomy that I know. After a preliminary period of neck stiffness there was a sudden onset of severe pain in the side of the neck, an apparent swelling of the tongue on the same side, and inability to roll food around that side of the mouth with the tongue. The infrahyoid muscles are supplied by cervical nerves—the thyreohyoid via the hypoglossal, the other infrahyoid muscles via the *ansa hypoglossi*. Compression of the third cervical root may thus lead to paresis of these muscles. The mylohyoid, now unopposed, pulls the hyoid bone and the tongue upwards. The tongue rises up in the mouth, giving the impression of a swelling. The infrahyoid muscles can no longer fix the hyoid bone, so that the tongue muscles are deprived of the fixed point from which they act. The patient is thus unable to roll food with the affected side of the tongue.

The Fourth Cervical Syndrome.—I have not seen an example of the fourth cervical syndrome. One would expect pain in the clavicle, shoulder tip and supraspinous region, paresis of the diaphragm, and possibly intractable hiccup. Routine radiographic examination of patients with pain in these regions (in an enthusiastic search for a fourth cervical lesion) has demonstrated a relationship between fibrositis of the shoulder girdle and disease of the cervical disks.

The Fifth Cervical Syndrome.—Pain radiates from the neck to the shoulder and the outer part of the arm. Sensory changes occur in the outer part of the arm. Weakness of the deltoid and a diminished or absent deltoid reflex are features.

The Sixth Cervical Syndrome.—Pain radiates via the antero-lateral arm to the radial part of the forearm, the thumb and the index finger. Sensory changes occur especially over the lower half of the radius and in the thumb and index finger. The thumb may be affected alone, or the middle finger may be involved as well, these variations perhaps depending upon whether the brachial plexus is prefixed or postfixed. Typically, weakness of the biceps and diminution of the biceps and supinator jerks are noticed.

The Seventh Cervical Syndrome.—Pain radiates via the postero-lateral part of the arm and the dorsal part of the forearm to the index and middle fingers. Sensory changes occur especially in the index and middle fingers. The thumb or the ring finger may also be affected. Typically, weakness of extension of the elbow, wrist and fingers and diminution of the triceps jerk are present.

The Eighth Cervical Syndrome.—Pain radiates via the postero-medial part of the arm and forearm to the ring finger. Sensory changes occur especially in the ring finger. The middle or little fingers may also be affected. Weakness of flexion of the thumb and fingers may be observed.

The First Dorsal Syndrome.—In two cases without X-ray confirmation, pain radiated down the inner aspect of the arm and forearm to the ring and little fingers in one case, and to the middle, ring and little fingers in the other. Sensory changes were observed in the affected fingers and in the antero-medial part of the forearm and arm as far as the axilla in the first case and as far as the elbow in the second. Wasting and weakness of the ulnar side of the forearm and of the small muscles of the hands were found. One patient had a ptosis of the upper eyelid, and Mayer's thumb reflex was absent in both cases.

Cervical Intervertebral Disk Disease.

Cervical intervertebral disk disease is a common condition. What we are accustomed to call cervical spondylitis is usually a late result of disk disease. Trauma plays a part in the ætiology.

The symptoms can be divided into four, perhaps five, groups. These may occur singly or in combination.

1. Neck pain. Cervical disk disease can cause acute neck pain even in the absence of nerve root involvement. In one of my surgically proven cases the patient had acute pain in the side of the neck, aggravated by flexion to the affected side, five days before the disk herniated and compressed the seventh root. Cervical disk disease can also cause chronic neck pain, and in some cases of "torn muscles" in the neck radiological evidence of disk disease is found. Out of 19 unselected cases of acute and chronic neck pain, in 14 radiological evidence of disk lesions was found.

2. Shoulder girdle pain. Just as herniation of a lumbar disk is sometimes associated with fibrositis of the buttock, so in two of my surgically proven cases there were fibrositic lesions in the shoulder girdle. Acute and chronic fibrositis of the shoulder girdle may apparently be due to cervical disk disease even in the absence of nerve root involvement. Out of 16 unselected cases of shoulder girdle pain, in 10 radiological evidence of disk disease was present. Control X-ray pictures have been taken of 38 apparently normal persons, aged twenty-one to sixty years, and these revealed disk lesions in six persons, aged respectively thirty-five, forty, forty-eight, fifty-one, fifty-three and sixty years. In a second series of 10 controls with a past history of stiff neck, shoulder girdle pain or brachial neuritis, eight provided radiological evidence of disk disease.

3. Radicular pain. The radicular syndromes have already been described. Compression of a nerve root may arise in three ways. (i) The disk may herniate laterally and compress the root. (ii) The disk may degenerate, and then the upper vertebra may subluxate forwards on the lower compressing the root in the narrowed foramen. This I have seen at operation. (iii) Osteophytes may grow out from the disk margins into the intervertebral foramen. Radicular pain may also be due to adhesions between the root and the disk.

4. Spinal cord compression from a central herniation of the disk.

5. Possibly spasm of the scalenus muscle. I do not think that the scalenus syndrome (if it exists) can yet be clearly distinguished from the eighth cervical and first dorsal syndromes, and at present I regard the scalenus muscle as a doubtful cause of nerve compression. In the past scalenotomy has given relief in many cases of disk disease. The operation allows the spine to flex towards the opposite side, thus relieving pressure on a nerve root. It also allows the whole plexus to move forwards. The nerve roots then take a shorter path, and tension on any one root is lessened.

On examination tenderness is present over the affected disk; but this tenderness is seldom localized as accurately as is the case in the lumbar region. More often there is also tenderness over the neighbouring spaces. Fibrositic nodules are often palpable in the muscles of the neck and shoulder girdle. In testing movements of the neck, one notices two clinical types.

FIGURE XXIV.

(i) The compression type. The neck is held flexed to the sound side. There is pain on extension (Figure XXIV) and on flexion to the affected side (Figure XXV). Forward

flexion (Figure XXVI) is painless, unless it stretches a nerve root over the disk, and flexion to the sound side (Figure XXVII) is painless or much less painful than flexion to the affected side. In the case of nerve root compression, flexion to the affected side may reproduce the

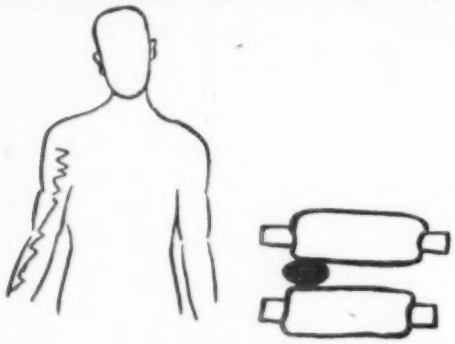

FIGURE XXV.

pain and paræsthesia. Here, of course, is another compression syndrome: pain on extension, pain on flexion to the affected side, painless flexion unless a nerve root is compressed, painless flexion to the sound side and deformity—either forward flexion (radiographic, *vide*

FIGURE XXVI.

infra) or flexion to the sound side (clinical). This cervical compression syndrome is completely analogous with the lumbar compression syndrome previously described. It occurs in herniation of a disk and sometimes in degeneration of a disk with nerve root involvement.

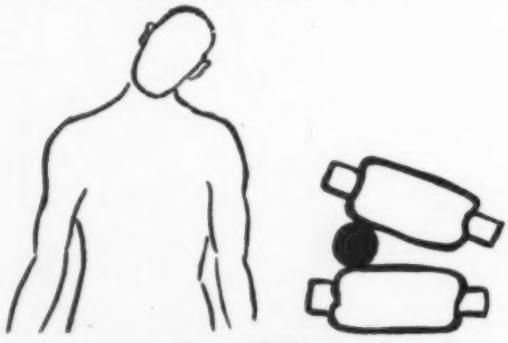

FIGURE XXVII.

(ii) The mixed type. Occasionally the head is held flexed to the affected side. Extension is usually painful (compression). Flexion to the sound side produces pain on the affected side (stretch phenomenon) (Figure XXVIII). Flexion to the affected side is painless (Figure XXIX). In this type the symptoms are often bilateral, and then lateral flexion produces pain on the opposite side. This mixed syndrome occurs in degeneration of a disk.

In early cases the radiograph reveals thinning of the disk or a localized flexion deformity. The latter can best be appreciated by tracing an imaginary line along the posterior borders of the vertebral bodies. This line should follow a smooth curve all the way from the upper cervical

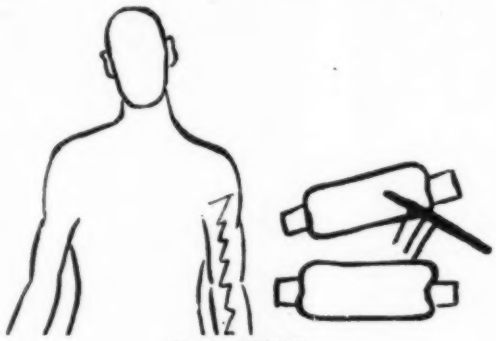

FIGURE XXVIII.

to the upper dorsal region. In disk disease this line is broken at the affected disk, which forms the point of intersection of two separate curves. The flexion deformity may become apparent only when the neck is flexed. After a time osteophytes form at the edges of the affected disk. More than one disk may be affected (Figures XXX to XXXV).

In the treatment of an acute lesion, heat and immobilization are essential. Traction applied to the head by a Glisson's sling is a valuable therapeutic measure in both acute and chronic cases, particularly when nerve root involvement is present. In chronic cases any fibrositic

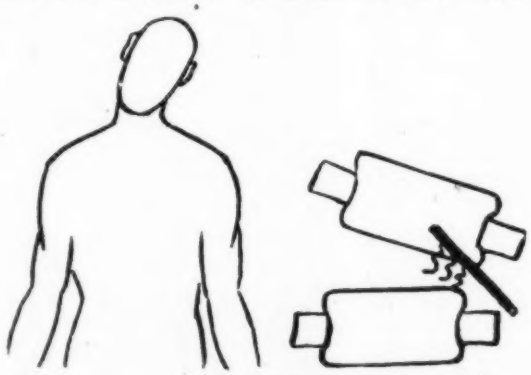

FIGURE XXIX.

lesions are still treated by heat and massage and occasionally by the injection of local anæsthetics. Manipulation may complete the extrusion of a partly herniated disk with disastrous results, and may do damage to patients with degenerated disks. The patient with compression of the third cervical root, to whom reference has already been made, died shortly after myelography from respiratory failure produced by movement of his neck in getting the lipiodol to flow to the desired place. Surgery has a definite but at present limited place in the treatment of these conditions. In cases of radicular involvement in which conservative treatment has failed, the nerve root is explored. A herniated disk is removed or the neural canal is uncapped to relieve any pressure on the nerve root.

Conclusion and Summary.

The lumbar intervertebral disks are a major factor in the production of low back pain. Root pains are not necessary either for diagnosis or for localization.

The cervical intervertebral disks are often the site of pathological processes. The resulting symptoms include stiff neck, shoulder girdle pain and cervico-brachial pain. These have hitherto been labelled fibrositis, brachial neuritis and spondylitis.

The dermatome charts of the upper and lower limbs have been redrawn and the radicular syndromes described. These need confirmation and perhaps alteration with further experience.

Future progress in this field will continue to be extensive, and must include careful clinical and radiological examination of patients such as I have indicated.

In the intervertebral disk lies the key to a large part of the problem of so-called rheumatic disorders.

Acknowledgements.

It is my pleasant duty to express my indebtedness to Dr. F. J. Clark, who has proved the truth of some of the ideas in this paper by pioneering the surgery of the cervical disk and the surgery of the lumbar disk for low back pain without radicular involvement; to Dr. G. R. Troup, who has mastered the anæsthetic problems; to Dr. D. I. Smith and Dr. W. R. Frayne for their invaluable radiological assistance; to Dr. R. Le P. Muecke, who has made available facilities for the control X-ray films; to Dr. M. A. Radcliffe-Taylor for many helpful suggestions; and to many colleagues who have referred patients for study.

References.

(1) J. H. Young: "Low Back Pain", THE MEDICAL JOURNAL OF AUSTRALIA, Volume II, 1943, page 181.

(2) F. K. Bradford: "Intervertebral Disc Problem in the Navy", *United States Naval Medical Bulletin*, Volume XLII, 1944, page 763.

(3) L. McK. Eaton: "Pain Caused by Diseases Involving the Sensory Roots (Root Pain): Its Characteristics and the Mechanics of its Production", *The Journal of the American Medical Association*, Volume CXVII, 1941, page 1435.

(4) H. Head: "On Disturbances of Sensation with Especial Reference to the Pain of Visceral Disease", *Brain*, Volume XVI, 1893, page 1.

(5) H. Head: "On Disturbances of Sensation with Especial Reference to the Pain of Visceral Disease, Part II, Head and Neck", *Brain*, Volume XVII, 1894, page 339.

(6) J. J. Keegan: "Neurosurgical Interpretation of Dermatome Hypalgesia with Herniation of the Lumbar Intervertebral Discs", *The Journal of Bone and Joint Surgery*, Volume XXVI, 1944, page 238.

(7) C. S. Sherrington: "Experiments in Examination of the Peripheral Distribution of the Fibres of the Posterior Roots of Some Spinal Nerves", *Philosophical Transactions of the Royal Society of London*, Volume CLXXXIV, 1894, page 641.

(8) W. E. Dandy: "Concealed Ruptured Intervertebral Disks: A Plea for the Elimination of Contrast Media in Diagnosis", *The Journal of the American Medical Association*, Volume CXVII, 1941, page 821.

(9) W. E. Dandy: "Improved Localisation and Treatment of Ruptured Intervertebral Disks", *The Journal of the American Medical Association*, Volume CXX, 1942, page 605.

(10) W. E. Dandy: "Recent Advances in the Treatment of Ruptured (Lumbar) Intervertebral Disks", *Annals of Surgery*, Volume CXVIII, 1943, page 639.

(11) W. E. Dandy: "Treatment of Recurring Attacks of Low Backache without Sciatica", *The Journal of the American Medical Association*, Volume CXXV, 1944, page 1175.

(12) J. S. Barr: "Sciatica Caused by Intervertebral Disc Lesions; A Report of Forty Cases of Rupture of the Intervertebral Disc Occurring in the Low Lumbar Spine and Causing Pressure on the Cauda Equina", *The Journal of Bone and Joint Surgery*, Volume XIX, 1937, page 323.

(13) R. G. Spurling and W. B. Scoville: "Lateral Rupture of the Cervical Intervertebral Discs: A Common Cause of Shoulder and Arm Pain", *Surgery, Gynecology and Obstetrics*, Volume LXXVIII, 1944, page 350.

(14) J. L. Ulmer and J. M. Meredith: "The Syndrome of Cervical Root Compression and Brachial Neuritis following Lateral Herniation of the Intervertebral Discs", *Virginia Medical Monthly*, Volume LXXI, 1944, page 119; abstracted in *Surgery, Gynecology and Obstetrics*, Volume LXXIX, 1944, page 105.

(15) J. J. Michelsen and W. J. Mixter: "Pain and Disability of Shoulder and Arm Due to Herniation of the Nucleus Pulposus of Cervical Intervertebral Disks", *The New England Journal of Medicine*, Volume CCXXXI, 1944, page 279.

Reports of Cases.

A CASE OF SIMMONDS'S SYNDROME.

By J. S. ROBERTSON,

From the Department of Pathology, University of Sydney, and the Fairfax Institute of Pathology, Royal Prince Alfred Hospital, Sydney

CASES of Simmonds's syndrome following massive post-partum necrosis of the anterior part of the pituitary have now been reported with sufficient frequency to render a detailed description unnecessary.[1][2] Such cases are, however, rare enough still to warrant recording. The present case is submitted both for this reason, and because it presents many features which are characteristic of this uncommon condition.

Clinical Record.

A.B., a married woman, aged forty-four years, was first admitted to the Royal Prince Alfred Hospital, Sydney, in September, 1939. She stated that her illness had begun eight months prior to this date with a sudden unheralded fainting attack. Thereafter she complained of headache, fainting, palpitation and weakness, together with some failure of memory, which continued until just before her admission to hospital, when for several days she had suffered from intermittent vomiting associated latterly with some diarrhœa, and finally a second sudden loss of consciousness. She was still unconscious on her admission to hospital, and did not regain full consciousness until some hours later.

The only relevant facts obtainable regarding her earlier history were that she had had a full-term stillborn child twelve years before, when she was aged twenty-eight years, and that following this she had had complete and permanent amenorrhœa.

Physical examination disclosed that the woman was pale and sallow; she weighed 112 pounds. Her speech was slow and slurred, and she appeared to be mentally sluggish. The skin was warm and dry, but less elastic than normal. No obvious wasting or obesity was present. No supraclavicular pads were present, nor was any thinning of the hair of the eyebrows or scalp detected. The visible mucous membranes were pale. The thyreoid gland was palpable, and moved on deglutition. No note was made of its size or consistency. The pulse was regular, at a rate of 84 per minute. The blood pressure was 90 millimetres of mercury, systolic, and 50 millimetres, diastolic. The heart was of normal size and the heart sounds were normal. There was a mild degree of general muscular weakness.

Special investigations gave the following results. The basal metabolic rate was −43%. The red blood cells numbered 4,790,000 per cubic millimetre, and the hæmoglobin value was 12·2 grammes *per centum*, the colour index being 0·89. There was no significant variation in the numbers or proportions of white cells. An electrocardiographic tracing was reported as showing evidence of distinct myocardial insufficiency, consistent with myxœdema of high grade. The blood urea content was 34 milligrammes *per centum*, and the blood creatinine content was less than one milligramme *per centum*. X-ray examination of the pituitary fossa showed that it was somewhat ring-shaped and rather small.

The patient was regarded as suffering from myxœdema, together with anæmia due primarily to deficiency of thyreoid secretion. After treatment with dry thyreoid substance, two grains three times a day for one month, the basal metabolic rate had risen to −22%, but the number of red blood cells had fallen to 3,700,000 per cubic millimetre and the hæmoglobin value to 10·3 grammes *per centum*.

At this stage the patient was discharged from hospital, to continue treatment with dry thyreoid substance under the direction of her family physician. Three weeks later she reported for determination of the basal metabolic rate, which was found to be +3%. It was then found possible to keep the condition fairly well stabilized with a dose of 1·5 grains of dry thyreoid substance per day.

At times, however, during the ensuing three years, the patient was subject to peculiar attacks, characterized by mental confusion, vomiting, and low blood pressure, which at the time were regarded as acute episodes of thyreoid deficiency. On July 1, 1943, a similar attack occurred, but of much greater severity. She was restless, stuporose, and mentally confused, and continually vomited small amounts of bile-stained fluid. Thyreoid (1·5 grains) was given, but

without effect, and the dose was repeated again next day, also without effect; in fact, this dose seemed to aggravate matters. She was accordingly readmitted to the Royal Prince Alfred Hospital on July 3, 1943.

On her admission to hospital she could with difficulty be roused a little, but would not answer questions. The pulse was of very small volume, and barely palpable at the wrist; the rate was rapid. The thyreoid gland was not palpable on deglutition, and the rings of the trachea could be felt. The scalp hair was dry, but there was no loss of hair on the eyebrows. The skin was dry and pale, but not thickened or coarse. The pubic and axillary hair was of normal amount and distribution. Considerable freckling of the arms and of the suprasternal region of the neck in the region exposed to light was present, but there was no general bronzing of the skin, nor were any large pigmented areas seen either on the skin or on the visible mucous membranes. There were no general or local alterations in the distribution of fat. No abnormalities were detected in the heart, lungs or urine.

For some hours after her admission to hospital the restlessness and stupor continued. That night some neck rigidity was observed, and Babinski's reflex was present on the left side; but a lumbar puncture revealed clear fluid under normal pressure. Without any change in her mental state the patient died soon afterwards, twelve hours after her admission to hospital. A diagnosis of Addisonian adrenal crisis had been considered, in spite of the lack of significant pigmentation of the skin; but death occurred so soon after admission to hospital that there was no opportunity for any laboratory investigations.

Post-Mortem Examination.

Examination was performed eight hours *post mortem*. There was no wasting, the abdominal fat measuring 2·5 centimetres in thickness. No myxœdematous deposits in the subcutaneous tissues were recognizable.

The thyreoid gland was thin and atrophic and much smaller than normal, each lobe measuring but 2·5 centimetres in the vertical diameter, 1·0 centimetre in the lateral diameter, and 0·5 centimetre in thickness. The isthmus was an extremely slender cord. The thyreoid substance was pale and a little more fibrous and firm than usual. The parathyreoid glands were not seen. The thymus was considerably enlarged, measuring six centimetres in the vertical diameter, five centimetres in the horizontal diameter, and 1·0 centimetre in thickness, while its weight was thirty grammes. The mediastinal lymph nodes were somewhat enlarged, soft and deeply pigmented with carbon.

The right lung (weight 370 grammes) was small and pale. At the apex there was a firm pleural scar measuring three centimetres by two centimetres, beneath which for a depth of 0·5 centimetre there was a patch of fibrous tissue. The lung substance was dry, and little blood was exuded on squeezing. In the left lung (weight 370 grammes) an apical scar was also present, measuring two centimetres by two centimetres, with an underlying area of fibrosis. There was no evidence of active tuberculosis in either lung.

The heart (weight 200 grammes) was very small. The myocardium of the right ventricle measured four millimetres and that of the left ventricle measured eleven millimetres in thickness. The chambers, valves and coronary arteries appeared normal.

The lymph nodes in the greater omentum and the mesentery were soft and pale, and examination disclosed slight general enlargement. No special features were detected in the spleen (weight 100 grammes) or the liver (weight 1,070 grammes). The right kidney (weight 70 grammes) was very small, but apart from this showed no special abnormalities to the naked eye. The left kidney (weight 90 grammes) was somewhat larger, and it also appeared essentially normal. Examination of the œsophagus, stomach and intestines revealed no special features. The pancreas was normal in size and appeared normal to the naked eye.

In both adrenal glands extreme atrophic changes were found. The right adrenal was represented merely by a small bag of fibrous tissue (the capsule), containing a little fluid, and a thin layer of yellow cortical tissue was attached to the inner surface of the fibrous capsule. The left adrenal was more conspicuous, but it also was a mere fibrous sac with a thin layer of glandular tissue attached to its inner surface.

The uterus was small and hyperinvoluted; it measured 5·0 centimetres by 2·5 centimetres by 1·2 centimetres, and approximately half of its bulk consisted of cervix. It was pale and easily cut. The Fallopian tubes were normal, but both ovaries were pale, soft and atrophic, the right, which was somewhat the larger, measuring 2·0 centimetres by 0·4 centimetre by 0·4 centimetre.

The small vessels on the cut surface of the brain were prominent, but apart from this no significant changes were to be seen. The clinoid fossa was small and shallow, the anterior and posterior clinoid processes being but 0·5 centimetre apart. In the pituitary gland only a small fragment of gland substance was present adhering to the stalk; it measured four millimetres in length and one millimetre in thickness.

Microscopic Examination.

Pituitary.—Very little anterior lobe substance was present, closely attached to the stalk. The gland measured four millimetres by one millimetre. The specific cells were rather sparse, often lying singly, and many of them appeared somewhat degenerate, with pyknotic nuclei and irregular granular cytoplasm. In the intercellular stroma a little œdema was present. Little of the posterior lobe was recognizable. It measured two millimetres by two millimetres. No special histological changes were visible in it. No microscopic evidence which might have provided a clue as to the original cause of the massive pituitary destruction was seen in the examination of these sections.

Thyreoid Gland.—The normal picture was entirely absent. Large bands of fibrous tissue were present, and the whole gland was diffusely and uniformly infiltrated with lymphocytes, lying among which there were some remnants of secretory epithelium, which at times were arranged in rudimentary alveoli with a just recognizable lumen. No colloid was visible.

Adrenal Glands.—In the left adrenal gland a thin layer of cortical tissue, one millimetre in thickness, was attached to the capsule, and in one place a slightly larger nodule was present. The cellular arrangement was in part preserved, but in some places, especially in the larger nodule of cortical tissue, there were many small rounded groups of cells which possibly represented attempted regeneration. A slight excess of fine fibrous tissue was present, and in many of the surviving cells some nuclear pyknosis was noted with irregularity and granularity of the cytoplasm. Few medullary chromaffin cells were visible. There was no lymphocytic infiltration, and no evidence of tuberculosis, the pathological change seemingly consisting of a general diminution in the amount of functioning tissue, both cortical and medullary, with some associated fibrosis. The right adrenal presented a similar picture, but the change here was more pronounced.

Thymus.—Hassall's bodies were conspicuous and of large size. In the lobules there was little distinction between cortex and medulla. A slight infiltration with adipose tissue was present.

Pancreas.—Islets of Langerhans were numerous, and of large size. They appeared normal, but gave the impression of being more numerous than usual.

Ovary.—The ovary presented the microscopic appearances of complete involution. No developing follicles, *corpora lutea* or *corpora fibrosa* were recognizable, and numerous large involuted vessels were present in the hilum.

Lungs.—In the right lung the apical scar consisted of dense fibrous tissue containing a few atrophic bronchioles and alveoli, and some carbon pigment. There was no evidence of past or present tuberculosis, though it is possible that the focus did in fact represent an old tuberculous lesion which had become completely inactive. The apical scar in the left lung showed similar features.

Commentary.

Cases of this type, which present a puzzling mixture of endocrine changes, fall into the class of "plurigiandular deficiencies". Much light has been cast on this group by the differentiation by Sheehan of a type of case in which the underlying factor is a necrosis of the anterior lobe of the pituitary which occurs *post partum*. These post-partum necroses, in contrast to the focal necroses which may occur in a variety of other conditions, are usually massive, leaving only a small portion of normal anterior lobe substance closely attached to the stalk, sometimes together with a thin surviving shell on the surface. Such necroses are of obscure causation, although they occur usually in cases in which the labour has been complicated by severe hæmorrhage or collapse. The histological appearance is that of an area of coagulation necrosis, sharply marked out from the surviving tissue. Eventually absorption of the necrosed area occurs, leaving a small portion of functioning lobe, in which subsequent fibrosis may or may not occur.

In this present case, no details of the patient's one pregnancy and labour could be obtained, beyond the fact that the child was stillborn. The presumption is, however, that such a massive necrosis of the anterior lobe had indeed occurred. Amenorrhœa, the first sign of endocrine deficiency, began just after this confinement.

After such a pituitary necrosis a variety of symptom complexes may result. Usually it is only the most severe cases, in which wasting and cachexia are pronounced, that are regarded as examples of Simmonds's disease. However, Hadfield and Garrod[3] suggest that if the name is to be retained at all, it ought to be applicable to all the sequelæ of pituitary destruction, whether mild or severe. If this suggestion is followed, this present case may be classed as an example of Simmonds's disease, in spite of the absence of wasting. In fact, on this reasoning, only in the minority of cases of the Simmonds syndrome will wasting be present.

Features resulting from failure of one or more of the endocrine organs dependent upon the pituitary may dominate the clinical picture, especially the thyreoid, adrenals and gonads. Failure of these three may, and often does, occur simultaneously, but in some cases the evidence is clear that the onset of failure of the various functions may be separated by months or even years. Such was the case in this instance. Amenorrhœa was present for a long period, apparently alone. Then symptoms of thyreoid deficiency began to become prominent, and the condition for years masqueraded as myxœdema. Peculiar crises, however, interrupted the clinical course. These form a most characteristic feature of this syndrome. They bear a considerable resemblance to the crises of Addison's disease, as was first suggested by Castleman and Hertz.[4] During such a crisis the patient is comatose, and convulsions and spasticity are common accompaniments, while anorexia, often with vomiting, usually precedes the attack. The blood pressure is low. The symptoms also bear some resemblance to those of hypoglycæmic attacks as well as to those of adrenal crises, and in many reported cases the blood sugar level during a crisis has been extremely low. Death finally occurred in one of these "crises".

The absence of significant skin pigmentation is of interest here. No case of this syndrome accompanied by skin pigmentation has been reported.

Many instances of the "pituitary" type of myxœdema, to which attention has recently been called by Lerman and Stebbins,[5] are probably closely akin to cases such as this. In some of them there may be a history of early amenorrhœa following a confinement, or examination may disclose sparseness of pubic or axillary hair, or alteration in the distribution of subcutaneous fat. Hyperinvolution of the uterus may be detected, and alteration in the excretion of 17-ketosteroids may be found. Rose[6] has stressed the need for great caution in thyreoid medication in these cases. If thyreoid therapy is too vigorous, the patient may be precipitated into a dangerous state of adrenal insufficiency.

The pancreatic changes were unusual. Islets of Langerhans are commonly difficult to find in persons who die of this syndrome; but in this woman they were prominent and of large size. The degree of involution of the uterus was also characteristic. It is interesting that this was first described by Simpson[7] as long ago as 1883, in a group of cases of post-partum wasting and amenorrhœa. The enlargement and persistence of the thymus, together with the slight general lymphoid hyperplasia, were also of interest, though of obscure nature. Boyd[8] states that these changes are often seen in Addison's disease, while Zondek[9] went so far as to relate them to the so-called *"status thymico-lymphaticus"*.

Summary.

A fatal case of pluriglandular endocrine deficiency is described, in which the underlying factor is considered to have been a post-partum necrosis of the anterior lobe of the pituitary. For some years after the onset the only abnormality was amenorrhœa. Myxœdematous features then supervened, and at this stage the illness was punctuated by peculiar and characteristic "crises", bearing some resemblance both to adrenal crises and to hypoglycæmic attacks, in one of which death occurred. At autopsy advanced regressive changes were found in the pituitary, thyreoid, adrenals and ovaries, as well as minor changes in other endocrine organs.

Acknowledgements.

I wish to express my indebtedness to Dr. T. M. Greenaway, into whose care the patient was admitted, for permission to publish this case; and to Professor W. K. Inglis and to Dr. F. B. Byrom for criticism and advice.

References.

(1) H. L. Sheehan: "Post-partum Necrosis of the Anterior Pituitary", *The Journal of Pathology and Bacteriology*, Volume XLV, 1937, page 189.
(2) H. L. Sheehan and N. G. B. McLetchie: "Simmonds' Disease due to Post-partum Necrosis of the Anterior Pituitary", *The Journal of Obstetrics and Gynæcology of the British Empire*, Volume L, February, 1943, page 27.
(3) G. Hadfield and L. P. Garrod: "Recent Advances in Pathology", Fourth Edition, 1943, page 332.
(4) B. Castleman and S. Hertz: "Pituitary Fibrosis with Myxœdema", *Archives of Pathology*, Volume XXVII, 1939, page 69.
(5) J. Lerman and H. D. Stebbins: "The Pituitary Type of Myxœdema", *The Journal of the American Medical Association*, Volume CXIX, May 30, 1942, page 391.
(6) E. Rose: "The Diagnosis and Treatment of Thyroid Disease", *Medical Clinics of North America*, November, 1942, page 1714.
(7) A. R. Simpson: "Superinvolution of the Uterus", *Edinburgh Medical Journal*, Volume XXVIII, 1883, page 961.
(8) W. Boyd: "Pathology of Internal Diseases", Third Edition, 1940, page 470.
(9) H. Zondek: "Diseases of the Endocrine Glands", 1935, page 375.

Reviews.

THE FŒTAL CIRCULATION.

THOSE familiar with the fœtal experimental work of Barcroft, Barron, Windle and others will welcome the synthesized and extended record of observations by Barclay, Franklin and Pritchard.[1] The authors worked partly in conjunction with Barcroft, but have adopted a cineradiographic technique to permit direct observation of the course taken by the fœtal blood. The animal mostly employed for the experiments was the sheep. The authors, however, are wisely diffident of drawing too close a parallel with the human. The fœtuses were delivered by Cæsarean section, placental circulation being preserved, and respiratory efforts were inhibited by covering the snout and maintaining warmth. A contrast medium ("Thorotrast", "Perabrodil", "Uroselectan" *et cetera*) was injected into a chosen vein—usually the umbilical or anterior *vena cava*—and its course was followed by serial radiographs. These were either direct, made with a special apparatus which exposed three to four frames a second, or indirect from a fluorescent screen. Thus were obtained fairly continuous records of blood flow through the heart and great vessels.

Radiographs disclosed that blood from the umbilical vein supplies a great deal of the liver in addition to short circuiting in part through the *ductus venosus*. Approaching the right atrium, the venous current is split into a small right-hand stream which goes to the right ventricle and a large left-hand stream which passes directly through the *foramen ovale* (*via sinistra*) to reach the left atrium. Blood returned by the anterior *vena cava* is directed by the intervenous tubercle (*crista interveniens*) to the right ventricle. Blood from the right ventricle passes mainly through the *ductus arteriosus* to the descending aorta which it equals in calibre, but a surprisingly large quantity reaches the lungs. Blood from the left ventricle is thrown into the aortic stem whence the first supply is to the coronary arteries and then to the head and superior extremities.

The authors point out that the fœtal circulatory system is one primarily adapted to the fœtal environment and only secondarily a mechanism to cope with post-natal conditions. Nevertheless, the purely fœtal portions—umbilical vessels, *ductus venosus*, *foramen ovale* and *ductus arteriosus*—become progressively more prepared to make the change-over as pregnancy advances. There is fair muscular development in the walls of the *ductus arteriosus* (in contrast with the almost purely elastic walls of the neighbouring pulmonary and aortic stems), a muscular sphincter marks the junction of the umbilical vein with the *ductus venosus*, and the umbilical veins are much more muscular in the cord than in the abdominal cavity. As gestation approaches its end these muscular mechanisms (which appear to be independent of nervous control) become more and more irritable, and shortly after delivery the increased oxygen tension in the circulating blood provides the stimulus for

[1] "The Fœtal Circulation and Cardiovascular System and the Changes that they Undergo at Birth", by Alfred E. Barclay, O.B.E., D.M., F.F.R., F.A.C.R., Kenneth J. Franklin, D.M., F.R.C.P., and Marjorie M. L. Pritchard, M.A.; 1944. Oxford: Blackwell Scientific Publications, Limited. 9½" × 7", pp. 390, with many illustrations. Price: 50s. net.

their closure. On the other hand, compression of the cord provokes inspiratory efforts. Closure of the *foramen ovale* by apposition of the *pars libera* also takes place within a few minutes. These changes are not immediately irrevocable, however, and for a time fœtal distress from fall in oxygen tension may cause the channels to open up again. An interesting discussion of events immediately after delivery leads the authors to make out a case for non-ligation of the cord in healthy babies. It is also shown that at the time of birth the placenta may contain up to one-third of the total fœtal blood: it is necessary to wait until this has returned to the fœtus—that is, until cord pulsations have ceased—before interfering with the cord. Rough manipulation of the cord at section rather than clean incision reduces any tendency to subsequent bleeding.

The book opens with an interesting survey of previous literature on the subject, commencing with Aristotle. It is pleasing to note the dismissal of the claims of Botallus to discovery of the *ductus arteriosus*; but the experimental work of Hugget receives no mention. Some of the earlier ideas on the fœtal circulation were very ingenious, even if erroneous, while the views of later workers came very close to this present factual record. Also included are a brief comparative survey of the fœtal circulation and a section dealing with the human condition. The last, as the authors are careful to point out, is purely tentative, and may long remain so.

To sum up, this is a valuable addition to scientific literature, whether from the historical, anatomical or physiological point of view. A major contribution is the development of a new technique; and if the result is not far from what was already believed, the search has brought to light many new and interesting facts. The illustrations are plentiful and of excellent quality, although some of the radiographs require a little experience for their reading. In some respects the authors seem to have been anxious to include rather too much material—the comparative section, for example, is a little breathless. The style is sometimes unnecessarily pedantic, while some of the new terms suggested—*via sinistra* for *foramen ovale*, *crista interveniens* for intervenous tubercle and *vinæ comites* for umbilical veins—appear to add to the burden of already overloaded nomenclature without any compensatory advantages.

Despite these criticisms this book is an extremely fine achievement which will provide knowledge, interest and food for thought for all those concerned with the problems with which it deals.

NEURO-OPHTHALMOLOGY.

IN "Neuro-ophthalmology" Dr. Donald J. Lyle has given us a comprehensive treatise on the relation between disorders of the eye and pathological conditions of the brain.[1] The book is written more particularly for the ophthalmologist, but neurologists and general physicians will find it a useful work of reference. The embryology of the neural structures of the eye and the anomalies of their development are described appropriately, as are also the anatomy of the visual tracts and their connexions and vascular supply. The photographs of dissections of the brain are clear and fulfil their purpose admirably. Tumours, infections including torular meningitis, degenerations and the ocular manifestations of head injuries are all dealt with at fair length and numerous illustrations, mostly reproductions of photographs of pathological conditions, add to the value of the text. There is an excellent picture of a section through the optic papilla showing the marked papilloedema in a case of torulosis.

With regard to the Argyll-Robertson pupil, Dr. Lyle appears to favour a lesion at the synapses between the light fibres from the retina and tectal or tegumental nuclear fibres to the parasympathetic nuclei of the oculo-motor centres.

The retinal changes in arteriosclerosis are well illustrated in the reproductions of stereoscopic photographs of the retina. The findings at autopsy in hypertension with marked retinal appearances reveal a high incidence of nephritic changes. Arteries of the same calibre in retina, brain and kidney are apt to be affected in a similar manner. Demyelinization of the brain, including Devic's *neuromyelitis optica* and the periaxial degeneration of Schilder, are included with multiple sclerosis, but not the rarer condition described by Pelizaeus and Merzbacher in which nystagmus may occur. Methods of clinical examination such as perimetry and the diagnosis of functional or hysterical complaints of double vision and blindness find no place here. Miner's nystagmus is not mentioned, but there is a brief reference to nystagmus as a reaction to poor lighting and fatigue.

The illustrations, numbering over five hundred, and charts are the outstanding feature of this work. Reproductions of photographs taken in a stereoscopic retinal camera call for special mention as a unique contribution to the description of clinical conditions. A pocket in the back cover contains charts for the recording of the site of lesions in the optic tracts. Could not a simple stereoscope be devised which could be folded in another pocket in the cover?

There are over seventeen hundred references in this valuable work, which should find a place in the library of every medical society. Clear type on glossy paper makes the volume attractive and easy to read and the reproductions of photographs are of a high standard. Both author and publisher are to be congratulated.

[1] "Neuro-ophthalmology", by Donald J. Lyle, B.S., M.D., F.A.C.S.; 1945. Springfield: Charles C. Thomas. 10" x 6½", pp. 415, with 234 illustrations. Price: $10.50.

ORTHOPÆDIC SURGERY.

THE third edition of Mercer's "Orthopædic Surgery" maintains the high standard of the other two editions and places this book in the forefront of text-books.[1] All subjects are fully treated and the information is up to date. But this book is not essentially a work of reference for specialists. The general surgeon and the general practitioner will find the subject matter so readable and so well set out that they will be able to find very practical advice on the solution of their problems. The author has brought to this book the wide training of a general surgeon who has devoted himself especially to one branch of surgery. A special feature of the work is the space devoted to pathology and morbid anatomy. The easy clear style in which the book is written makes reading pleasant. The drawings and diagrams are well chosen and well reproduced. As mentioned in the preface, the chapters on circulatory disturbances, affections of the back, knee, shoulder and foot and infections of the hand have been largely rewritten. The last-mentioned contains information that every general practitioner requires. The general surgeon as well as the orthopædic surgeon cannot well afford to be without this book on his shelves.

Notes on Books, Current Journals and New Appliances.

THE AUSTRALIAN POETS.

IN a small book with the intriguing title of "Fourteen Minutes", H. M. Green has provided a useful short critical summary of the Australian poets from Charles Harpur to the present day.[2] The material used is the substance of talks delivered in 1942 for the Australian Broadcasting Commission. Mr. Green, who is an acknowledged authority on Australian poetry, has a happy facility for presenting in a few words the background of each of the poets he discusses, so that although the work of the earlier writers may have ceased to interest us, we find that a better understanding of their circumstances reawakens appreciation. Possibly those interested in poetry find themselves better in tune with the spirit and substance of our later poets than with those of such early singers as Kendall; but even so, the reading of Mr. Green's critical comments on the more recent Australian poets will not come amiss. The introduction, "How Australian Literature Began", presents a short epitome of the literary history of the colony, and provides necessary references to the political and developmental sides of our early days. In general, it may be said of Mr. Green's little book that it represents a successful attempt at reconciling the early and the late in Australian poetry in the minds of all readers of goodwill, and that it may succeed in convincing sceptics that some Australian poetry is worth reading.

[1] "Orthopædic Surgery", by Walter Mercer, M.B., Ch.B., F.R.C.S. (Edinburgh), F.R.S. (Edinburgh), with a foreword by Sir John Fraser, Bart., K.C.V.O., M.C., F.R.S. (Edinburgh), F.R.C.S. (Edinburgh), M.D., Ch.M., F.R.A.C.S., F.A.C.S.; 1943. Third Edition. London: Edward Arnold and Company. 9" x 9¼", pp. 956. Price: 45s. net.

[2] "Fourteen Minutes: Short Sketches of Australian Poets and their Work, from Harpur to the Present Day: Based on Wireless Talks Delivered for the A.B.C. in 1942", by H. M. Green; 1944. Sydney: Angus and Robertson Limited. 7¼" x 4¼", pp. 198. Price: 6s.

The Medical Journal of Australia

SATURDAY, AUGUST 25, 1945.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

PEACE.

FOR the second time in its short life of a little more than thirty years the journal has had to record the termination of a world war. To many of the older members of the medical profession a great deal of all that has happened during the past six years is an echo of the first world war. But since those days a new generation has arisen, the child, depicted by the cartoonist as crying after the conclusion of the Treaty of Versailles, has grown to manhood and has fought, suffered and died to save the civilized world a second time and to make it safe—for what? This is the question which every man and woman in the community must ask and for which every man and woman must find an answer. The older generation cannot shirk it any more than the younger. The younger men and women of today clearly have to blaze a way for the future, but they are entitled to what help the elders can give. They know that something went wrong last time and they will not wish to repeat the old mistakes. They want to know whether these mistakes can be avoided. Old and young, if they combine, can surely achieve something that will withstand the test of time, something more in consonance with the true spirit of man than we thought was good enough during the last twenty years.

What, then, is peace? When the Japanese decided on August 15 to accept the terms of unconditional surrender demanded by the Allied Nations, some of the newspaper placards in our city streets displayed the word "Peace". The thoughtful person wondered whether peace had come. He probably decided that it had not yet been achieved, but if he was an optimist—and optimism is a great spur, a great tonic, for the future—he said to himself that it could and would follow. Optimism in this, as in other matters, is not enough; it needs as well a conviction of the justice and the rightness of one's cause, a will to pursue it, even at some personal inconvenience and sacrifice, and a faith in one's fellow man. The "cease fire" marked the first stage on the road to peace. It signified the end of the killing, the killing by the shedding of blood; it spelled the finish, the frustration, of the enemies' aggression and attempts at world domination; it was a promise of the return to their homes of our own fighting men and others in the services as well as of our countrymen who have languished in enemy prison camps; and some perhaps, with ears attuned to words rather than with hands ready to work, were prepared to sit back and to wait for the "new order", of which rumours had reached them. The "cease fire" will be followed by the drawing up of peace treaties. Here the factor of the greatest import will be the justice of the conditions, as well as some attempt to make the defeated nations realize their justice. One of the ways in which this can be done is by the force of example—a realization that peace is not complete which is merely a state imposed on others. Peace must also be willingly accepted and practised by ourselves. It will be ridiculous and also of little use to attempt the establishment of peaceful relations with other nations unless we are at peace among ourselves. We cannot look for justice among nations if we have injustice within our own borders. We cannot expect nations not used to a democratic way of life to adopt it and pursue it, even at the point of a bayonet "in occupation", unless in our own national life we show that such a way of life is worth while. From this it will be abundantly clear that peace is not a negative state to be enjoyed without any effort, without the deserving of it. It is something that demands continued effort, a continual striving upwards, just as surely as it must always be deserved. Before we pass on to consider the practical application of these ideas, it may be worth while to point out that the "cease fire" between nations at war and the drawing up of peace treaties on the one hand and the establishment of justice and real amity on the other have their counterpart very often in the life of the individual. Amiel wrote that he experienced two kinds of peace. One rested on the absence of pain and opposition; it was a favour, a luxury, and so it was fragile and dependent. The other was a moral peace, victorious over all ills, tried, real, positive and able to brave new tempests. The point is worth consideration for, as Saint Paul implied, if we follow after the things that make for peace, we may be able to edify one another.

What, then, is our immediate duty? The task of framing the international basis of the new peace is for the chosen leaders of the Allied Nations. This is one part; the other we hear bandied about on everyone's lips as the "winning of the peace". There can be few members of the community with any thoughts about the matter who have not declared that the task lying ahead is as great if not greater than the task of defeating the enemy, just completed. The setting of our own house in order, the establishment in our own so-called democracy of justice, of fair dealing and of mutual trust has been mentioned. This national task can be achieved only if the individual men and women comprising the nation understand that it is their own individual affair. The job will be no easy one. It was stated in these columns in 1919 that the problems of peace are far more complicated than those of war, and that the problems of a newly found peace are even more confused and difficult of approach. The spirit of optimism has been

mentioned. Approached in this spirit, the problems will be solvable. In the community generally, one of the first essentials is a willingness to work, to do to the best of one's ability the appointed or chosen job. This applies to every member of the community, to the man who works with his hands as well as to the man who works with his brains, to the doctor as well as to his patient. It does not matter much how many hours in the day a man is called upon and agrees to work, provided he does honest work during that period. He will achieve no moral peace, no moral strength, unless he does; and the whole community, if it is served by a nation working with one eye on the clock, will have no moral peace, no moral strength. How far compulsion should be applied to slackers is a question that may be argued. Ideally a slacker will see the futility of his ideas in the poise that is achieved by those who do their duty. What applies to those who work for other people applies equally to the latter. The employer, whether he employs trades union, professional or other kind of worker, if he is to pull his weight in this post-war process of reconstruction, will see that he treats his employees with justice and consideration. Too often amity is made impossible by unfounded suspicion and it should not be regarded as Utopian to suppose that some day forceful action will give place to discussion and an attempt at understanding. Compulsion has been mentioned. Of this it may be stated that when penalties have been laid down by authority for certain untoward action and that action has been proved, the penalty should be applied without fear or favour.

If we turn finally to the special post-war problems of the medical profession in the post-war reconstruction, we find much to concern us. In 1919 it was stated in this journal that if we accept the lessons of the war we must set to work to render the medical profession of greater use to the community than it has been in the past. Those words apply with greater force today. As a first care will be the rehabilitation of medical officers of the services, for the twofold purpose of absorbing those officers into the civilian life of the community and of providing adequate medical attendance for the community. New advances in knowledge have been made by those in the services and they must be applied to civilian life; on the other hand the usages of civilian practice will need to be demonstrated, and in some cases retaught, to doctors freshly returned from active service. The question of rehabilitation of medical officers of the services has been discussed on several occasions in these columns and need not be pursued further at the moment. On the corporate side of medical life much remains to be done. The Federal Council of the British Medical Association in Australia has enumerated many ways in which medical practice may be made more useful to the community. These advances, for advances they are, must be sought even though no spur such as threatened government action is applied. The betterment of the health of the people by a smoothly running and efficient medical health service, preventive as well as curative, is essential to peace within the boundaries of our own country. A final word about the establishment of a beneficent peace has to do with the type of person who serves on the parliamentary benches. Every type of person, that is to say, every calling, trade and profession, has some special gift that can be used in the public welfare. The mere possession of this gift implies a responsibility. The question has often been raised whether medically trained persons have done their duty in the public life of the country. It is a question that may well be asked in this post-war period. What we are really looking for as a nation is wisdom. Wisdom is often a gift from the gods; sometimes it may be bought with long experience. But we may remember that Solomon said of wisdom that: "Her ways are ways of pleasantness, and all her paths are peace."

Current Comment.

THE PHYSIOLOGY OF THE PROSTATE GLAND.

IN these days, when much is being written on the hormonal treatment of malignant disease of the prostate and hopes for the future are centred round this method of treatment, it is essential to keep in mind the physiology of the organ, lest enthusiasm get the better of judgement and imagination be allowed to run riot. For this reason attention should be drawn to a recent review of the physiology of the prostate by Charles Huggins, who writes from the Department of Surgery of the University of Chicago.[1] He holds that from the research standpoint the prostate is of interest for three reasons—its dependence on hormones, the remarkable nature of its secretion, and the frequency of neoplastic growths in the gland in several species including our own.

In the first place paraurethral glands homologous to the male prostate and with identical histological appearances occur in certain female creatures. In women Virchow observed small nodules in the proximal portion of the urethra which sometimes contained concretions similar to the prostatic calculi of men. Most of the observations have been made on the rat. The female prostate is stimulated by androgens and depressed by œstrogens and castration. Turning to the male prostate, Huggins points out that the prostate is unessential to mammalian life, since it is absent in some females. It is also unessential for fertility, since guinea-pigs have become pregnant after insemination with sperm from the isolated epididymis. Excision of the prostate and seminal vesicles abolishes fertility. The prostate is essential for fertilization by the natural method in mammals, since the amount of fluid in which the sperms are contained in the *vas deferens* is so small that, without dilution, it could hardly be delivered from the urethra at ejaculation. Thinning and increasing the volume of the sperm are thus functions of the prostate. The prostate is not an endocrine gland. The evidence in support of the view that it elaborates an internal secretion is "oblique and unconvincing". The principal methods of investigation of prostatic function depend on determination of the size of the gland, its cytology, and qualitative and quantitative studies of its secretion. Huggins gives examples of these (his review has no less than 154 references to the literature) and refers particularly to indirect methods of studying the secretion. These concern the measurement of acid phosphatase in the blood or urine. Acid phosphatase values in serum are increased in certain patients suffering from metastatic cancer of the prostate, and as a matter of fact it was the serial study of this enzyme that gave the first indication of the activity of hormones on disseminated human prostatic cancer. The urine of adult normal men contains threefold to fivefold greater amounts of acid phosphatase than that of women or children, and the daily amount of enzyme excreted by a single individual is nearly constant. The prostate excretes small amounts of fluid at frequent intervals; this is the resting secretion. The secretion is greatly augmented by parasympathetic stimulants; this is the stimulated secretion. The resting secretion is discharged usually from the urethra in the urine. It has been calculated from the

[1] *Physiological Reviews*, April, 1945.

amount of acid phosphatase excreted daily in the urine, 613 units on an average, that the amount of prostatic fluid secreted by man is in the order of 0·5 to 2·0 millilitres per day. In the dog resting secretion is about 0·1 to 2·0 millilitres per hour; after the urine has been deviated by the prostatic isolation operation, the "tree reflex" is well preserved and the animals approach the legs of laboratory tables and void prostatic fluid at frequent intervals. Prostatic secretion is primarily a function of androgenic activity, and secondarily of chemical and nervous stimulation; rises of acid phosphatase in the urine occur after sexual stimulation in man. It used to be claimed that occlusion of the outflow of prostatic secretion caused atrophy of the gland, but the experimental technique was defective; when the ducts of dogs injected with androgen were plugged with transplants of muscle, prostatic atrophy did not occur. Starvation of dogs injected with androgen for three weeks led to an increased secretion of prostatic fluid and definite growth of the prostate. The composition of the secretion was not disturbed by inanition. In the dog stimulation of the hypogastric nerves and the *nervi erigentes* induces prostatic secretion. In man stimulation of the hypogastric nerve causes ejaculation of semen. In regard to the pharmacodynamic effects of prostatic secretion, Huggins refers to the pressor action of prostatic extracts from the dog and bull, and remarks that it is probably due to epinephrin, since this substance has been demonstrated in the prostate in considerable amounts. A vaso-depressor substance known as prostaglandin occurs in extracts of the prostate and in prostatic fluid obtained at autopsy on man. This substance lowers blood pressure and increases intestinal motility in the atropinized rabbit and dilates the vessels of the hind limbs of the frog; larger quantities have been found in the prostate of the adult than in children.

In regard to the composition of prostatic secretion, reference will be made only to the enzymes. Four are mentioned —phosphatase, fibrinolysin, fibrinogenase and a group of miscellaneous substances. Phosphatase is a chemical secondary sex characteristic; no function for it has been discovered. The fibrinolysin of human semen is derived from the prostate gland. This enzyme closely resembles streptococcal fibrinolysin, previously recognized only in association with bacteria. Human semen contains much more fibrinolysin than it does fibrinogenase. In regard to the effect of the prostatic fluid on spermatozoa, the result is said to be an increase in motility. However, experiments have not been carefully carried out and it is impossible to exclude as a cause of the acceleration non-specific factors, such as dilution of thick sperm, the effects of inorganic ions and changes in gas tension. It is known that in man the prostate during ejaculation discharges most of its secretion before the seminal vesicle in roughly a one-two relationship.

The relation of endocrines to prostatic function is of practical interest to clinicians. In the normal prostate the acinar epithelium is composed of columnar cells. It is these cells which carry out secretion, and it is on them that androgen has its influence. When androgen is withdrawn the cells decrease sharply in height. Testosterone propionate in doses of ten milligrammes a day gives measurable prostatic secretion in immature dogs after three to seven injections, and a steadily rising secretory curve takes place for at least five months; in hypogonadism in the male androgens initiate and increase prostatic secretion, but when administered to normal man testosterone has little effect on the seminal output. Soon after the introduction of crystalline androgens it was found that the characteristic cytological effects of androgen on the prostatic epithelium could be abolished under certain conditions by the simultaneous administration of œstrogenic hormones in the mouse, rat and monkey. In regard to prostatic secretion, œstrogen is able to nullify the effect of androgen. The prostate in late fœtal life and in newborn boys is usually the site of epithelial metaplasia in the utriculus and collecting ducts. This metaplasia is due to œstrogen. When œstrogen is given for long periods to the intact mouse, dog or monkey, urinary retention follows, with uræmia and death; the posterior lobe of the prostate and the utriculus become enormously distended with retained secretion. Since the introduction of anti-androgenic methods of treatment of cancer of the prostate, numbers of men have been treated for long periods without "œstrogenic urinary retention". Man is, Huggins states, apparently the only mammal in which this phenomenon does not occur.

Benign prostatic hypertrophy or, as some authorities prefer to call it, hyperplasia, starts in the periurethral region with the appearance of nodular growths. Huggins points out that the epithelium is invariably tall columnar, so that androgens must be present in physiologically effective amounts; at the same time much evidence suggests that androgens are not produced in as large quantity in old age as in young men; "despite this the prostate grows". Huggins holds that prostatic hypertrophy is certainly a neoplastic condition. There is no evidence that œstrogen has a causative influence on it. To account for the facts Huggins postulates a decreased threshold to androgen in the spheroidal nodules which permits prostatic growth in the face of decreasing androgen production. The last-mentioned condition—hypertrophy of the prostate—is really outside the subject of prostatic physiology, though it is difficult to consider one without the other. The trouble is that much remains to be determined about so-called hypertrophy of the prostate. Best and Taylor state that "the whole question of the causative factors in prostatic hypertrophy is rife with speculation and beset with contradictory observations and opinions". Further, as Silverton pointed out in a discussion in this journal about a year ago, some fairly large "prostates" may prove to be fibromyomatous. In this case true prostatic tissue is not involved. But this question is quite outside our original subject.

APPENDICITIS IN THE NEWBORN.

THE occurrence of acute appendicitis in the very young is a rarity. Information on the subject is a little difficult to obtain. E. A. Maylard, of Glasgow, in 1920 made an analysis of the sex and age incidence in one thousand cases.[1] The youngest patients in the series were four males between the ages of three and four years. In each instance a *Bacillus coli* abscess was present; in two stercoliths were present, in the third the appendix was gangrenous, and in the fourth there was an ulcer that had perforated. The occurrence of a severe lesion in so young a subject is not surprising in view of the difficulty in diagnosis, if for no other reason. In the "Medical Annual" of 1934, Arnold, of Danzig, is mentioned as having produced statistics to show that among patients under ten and over seventy years of age in more than half the cases the condition goes on to abscess formation or peritonitis. W. Etherington-Wilson reports a case of acute appendicitis occurring in a male baby sixteen days old.[2] He gives a short review of the literature and mentions a group of fifteen patients under four weeks of age, six of whom recovered and nine of whom died. The appendices of the six patients who recovered were in hernial sacs; the other nine were truly intraabdominal. Unfortunately his bibliography is so arranged that it is impossible to tell by whom this series was reported. In his own case a diagnosis of peritonitis was made and the appendiceal lesion was discovered only on laparotomy. The child was desperately ill. The appendix was in a retrocaecal position, the caecum was immobile, and diffuse peritonitis was present. The pelvis was drained and the wound was sutured. Temporary improvement took place as a result of compensation for the pre-operative dehydration, but the patient died forty-eight hours after operation. Spinal anæsthesia was used and proved satisfactory; Etherington-Wilson thinks that the child was possibly the youngest and smallest (the weight was three pounds four ounces) to receive this type of anæsthesia. It would be of interest to discover how many babies recover from general peritonitis of appendiceal origin.

[1] *The British Journal of Surgery*, Volume VIII, 1920-1921, page 189.
[2] *Proceedings of the Royal Society of Medicine*, March, 1945.

Abstracts from Medical Literature.

PATHOLOGY.

Biopsy and Early Skin Grafting.

J. E. PRITCHARD (*Annals of Surgery*, February, 1945) discusses the desirability of the use of biopsies in the management of early skin grafting of burns, and six selected cases are cited as illustrations. All these wounds were undressed between the ninth and fourteenth days with the intention of grafting if necessary. Biopsies were done in all six cases because of doubt as to the status of the wounds. In the first three cases delayed paraffin sections were used, and in the last three, rapid frozen sections and delayed paraffin sections were employed. In Case I, the biopsy showed well-advanced healing and no grafting was needed. In Case II, the biopsy and grafting were done at the same time; later, the examination of the biopsy indicated that grafting was not needed, and this was borne out by the subsequent behaviour of the graft. In Case III, after biopsy on the fourteenth day, the wound was redressed to await the report on the paraffin sections. This indicated the necessity of grafting, which was not done until the twenty-fifth day—an unnecessary delay. Had a frozen section been made, grafting might have been done on the fourteenth day. In cases IV, V and VI, by rapid frozen section biopsies, when the first dressing was removed on the eighth, eleventh and thirteenth days respectively, the necessity for grafting was indicated; it was carried out without further delay and with entirely satisfactory results.

Proliferative Lesions in Multiple Myeloma.

ELIZABETH LOWENHAUPT (*The American Journal of Pathology*, January, 1945) describes a lesion of the reticulo-endothelial system in multiple myeloma, particularly as it is found in the spleen and lymph nodes. In the spleen this lesion consists of the intrasinusoidal proliferation of plasma cells from sinus lining. In addition, plasma cells are found throughout the red pulp. In lymph nodes plasma cells proliferate in the interfollicular tissue. Lymphoid structures remain intact in both these organs. The presence of a closed system of littoral cells in the spleen, in contrast to that of lymph nodes, is suggested as the explanation for the localization of plasma cells in relation to sinus lining only in the former organ. These lesions, as well as the distribution of leuchæmic infiltration when the liver is involved, and the tendency to involve bone, suggest that plasma cells do not arise from lymphocytes or their immediate precursors, but that they arise, at least in this disease, from tissue histiocytes. It thus appears that plasma cell myeloma is more closely related to diseases of monocytic or clasmatocytic type than of lymphoid type. It is pointed out that the disease, multiple myeloma, consists at necropsy of a diffuse proliferative process involving the entire reticulo-endothelial system, regardless of its predominant skeletal or local onset. In origin the plasma cell is related to those cells which have been specifically shown to be concerned in antibody formation. According to the author, previous observations on the occurrence of the plasma cell suggest that it, too, forms globulin and is concerned with the formation of antibody globulins and in abnormal states with hyperglobinæmia.

Comparative Studies of Cancerous and Non-Cancerous Breasts.

F. W. FOOTE AND F. W. STEWART (*Annals of Surgery*, January and February, 1945) have tried to determine whether fundamental structural differences exist in the breast tissue of women who have mammary cancer and those who do not suffer from this disease. In other words, their main objective has been to ascertain if there is any characteristic "soil" in which mammary carcinoma is apt to develop. Another interest has been to search for abnormalities in these breasts which could be referred to certain hormonal influences, and finally an attempt has been made to evaluate the relationship between so-called chronic cystic mastitis and mammary cancer. The authors' conclusions are as follows. Atrophy of the breast as judged by the number of lobules present depends upon the factor of age, and does not differ in cancerous and in non-cancerous breasts. Macroscopic cysts are much commoner in non-cancerous breasts, particularly in women between forty and fifty years of age. During this period they are least common in cancer-containing breasts. No distinct difference in the frequency and extent of duct papillomatosis is found in cancerous and non-cancerous breasts. Macroscopic papillomata are somewhat more common in non-cancerous breasts. Cancer-containing breasts are about five times as apt to show papillomatosis which is cytologically atypical. Every transition from atypical papillomatosis to duct cancer can be traced microscopically, such phases being demonstrable on occasion in a single breast. Blunt duct adenosis appears to be a common precursor to cyst formation. In cancerous breasts between the fourth and fifth decades blunt duct adenosis is the most common, and cysts are comparatively few, indicating, in this class of breast, that blunt duct adenosis tends to retain its proliferative capacity. The origin of mammary cancer can be traced histologically to blunt duct adenosis in only a very few cases. Apocrine epithelium is common in both cancerous and non-cancerous breasts, and of not pronouncedly different character. Rare cases of mammary cancer can be traced to this source. Sclerosing adenosis in cancerous as opposed to non-cancerous breasts shows no outstanding differences. The early or "florid" phase is more common in younger women, but can be observed as late as the sixth decade. The triad of lesions, including stasis of duct content, duct dilatation and periductal mastitis, exhibits similar traits in both cancerous and non-cancerous breasts. No evidence was obtained that they furnish a starting point for development of mammary carcinoma. Two forms of periductal mastitis can be distinguished—primary and secondary. The latter is the more common. Structural abnormalities of the mammary lobules are described. These can be separated into two groups referred to as primary and secondary lobular alteration. Intralobular hyperplasia of pathological type can be shown in some cases to merge gradually with lobular mammary carcinoma *in situ*. The authors present evidence that the true component parts of "chronic cystic mastitis" should include cysts, duct papillomatosis, blunt duct adenosis, apocrine epithelium and sclerosing adenosis. Perhaps a sixth lesion, primary lobular alteration, may be included. Fibro-adenoma is excluded. Estimations of the frequency of so-called chronic cystic mastitis depend upon what and how many lesions are deemed essential in the making of that diagnosis. Statistical and morphological studies indicate that chronic cystic mastitis does play a role in the development of human breast cancer. How large this is cannot be stated. The studies suggest that its part consists largely in those papillary hyperplasias which in some individuals, for reasons unknown, become cytologically atypical. In other words, some people cannot handle the hyperplasias which to others seem controllable and innocuous. The pathological findings in breasts from nine women treated with œstrogenic substances are recorded. In one case remarkable structural features were present and these are fully discussed. The failure of the breast tissue to respond uniformly to administration of hormone may depend upon individual differences in susceptibility. Thresholds of reactivity may vary through a broad range. Judged by the few cases available for study to date, wherein, with one notable exception, treatment by œstrogens has produced no noteworthy specific alteration in breast structure, it can at least be stated that no progressive series of changes beginning with a normal breast and ending with mammary cancer has been encountered. In the exceptional case, whereas hormone alterations were indeed profound, there were reasons to doubt their significance in the production of the cancer.

The Inheritance of Cancer in Mice.

E. W. MILLER AND F. C. PYBUS (*Cancer Research*, February, 1945) state that the incidence of mammary carcinoma has been investigated in a series of crosses and back-crosses between Simpson (high tumour) and Edinburgh (low tumour), and Simpson and CBA (low tumour) strains of mice. The results confirm the existence of a maternal extra-chromosomal factor for mammary carcinoma discovered by previous workers, and also show that an important part is played by inter-strain genetical differences in susceptibility. No extrachromosomal factor was observed in the inheritance of lung tumours, hepatomata or bone tumours, while the evidence was inconclusive in the case of lymphadenopathy.

Chemical Basis of Fever with Inflammation.

VALY MENKIN (*Archives of Pathology*, January, 1945) believes that a pyrogenic factor is associated with the euglobulin fraction of inflammatory exudate. To a large extent it can be dissociated from necrosin, a toxic material, which in turn either is a euglobulin or is at least a substance closely linked with that protein fraction

of exudate. The dissociation of the pyrogenic factor from necrosin is accomplished by differential solubility. Necrosin is soluble in water containing sulphate ions, whereas the pyrogenic factor fails to be appreciably dissolved in the presence of such ions. The pyrogenic factor is termed, for the sake of convenience, pyrexin. Its exact chemical nature is still problematical. It appears to be a hydrolytic product brought about by the action either of necrosin or of proteolytic enzymes associated with the latter. Pyrexin is non-diffusible, and it is heat stable. Its nitrogen and phosphorus concentrations are about 11% and 1% respectively. Pyrexin is essentially absent in normal non-hæmolysed blood serum, but it is present to some extent in hæmolysed serum and also in the serum of an animal with a concomitant inflammation. In experiments on dogs a pyrogenic factor was recovered in increasing amounts from urine with progress of an inflammatory reaction in the pleural cavity. The evidence suggests that one is dealing with pyrexin, which is eliminated at least in part in the urine. Pyrexin offers a reasonable explanation for the primary mechanism of the fever frequently accompanying inflammation. Preliminary indirect studies suggest that its mode of action may possibly be via the hypothalamic heat-regulating centres.

MORPHOLOGY.

Epithelium and Lymphocytes.

B. F. KINGSBURY (*The American Journal of Anatomy*, September, 1944) discusses the problem of the fate and function of lymphocytes, including their migration, transformation and degeneration, and gives an account of his investigation into the source and nature of the so-called salivary corpuscles. As it is only in cells from the crypts of the tonsil that an examination of cells which have passed through the oral epithelium can be conveniently studied, he confines his present investigation to this region. Also, because of its size and simplicity, the cat's tonsil was chosen for study. He finds that the cells of the sub-epithelial zone in the main possess an abundant strongly basophile cytoplasm, but within the epithelium the penetrating cells speedily lose any basophilia they may possess, the cytoplasm becomes scanty or indistinguishable, the nucleus usually tends to enlarge and become less chromatic. Within the superficial layers of the epithelium or within the crypt the nuclei of the lymphocytes tend to become polymorphous. This is interpreted as an incipient fragmentation and degeneration. Marked migration of polymorphonuclear leucocytes through the epithelium was not observed and no eosinophile or basophile cells were seen in the epithelium or the crypt.

Morphological Similarity of Neuroglia Fibres to Fibres of Connective Tissues.

W. ANDREW AND C. T. ASHWORTH (*The American Journal of Anatomy*, November, 1944) find that neuroglia fibres are, primarily at least, extracellular border fibres, resting on the surface of the cytoplasm of fibrous astrocytes and following their processes in intimate contact. The neuroglia fibres often extend beyond the limits of the cytoplasm of the processes of individual astrocytes. The authors also observed neuroglia fibres which seemed to be entirely free from cells. Neuroglia fibres are frequently undulatory in their course, vary greatly in size, and aid in support of the walls of small vessels within the nervous system. The authors believe neuroglia fibres to be homologous (similar in fundamental morphology and origin) with the fibres of other connective tissues (reticular and collagenous) and to serve a similar supportive function. The existence of such a connective tissue (the neuroglia) with the great majority of its fibres in the most intimate contact with cells supports the view that there is a direct participation of individual cells in the production of individual fibres in the connective tissues. The morphological relationship of fibres to cells in neuroglia is similar to that seen in the mesenchyme of the embryo pig, in that the fibres in both cases rest on the surface of cells and follow the cell processes.

The Cells in Pancreatic Islets.

W. L. HARD (*The American Journal of Anatomy*, November, 1944) finds that in the embryonic and early post-natal stages of development the islets of the pancreas originate from three, and possibly four, sources as distinguished by their position with respect to the developing duct system. The first islets, three or four in number, differentiate in the thirteen-day embryo from the wall of the solid pancreatic cord. The majority of embryonic islets take their origin from the pancreatic tubules. This type of islet origin is first seen in the fifteenth day, but the most active production occurs from sixteen to eighteen days. The embryonic islets persist in the post-natal animal, and, in the adult, are represented by the larger interlobular and intralobular islets. During the first week of post-natal life there occurs a considerable increase in the formation of new islets. These arise from two sources. The majority originate from the terminal portions of the secretory duct system at the base of acini. Occasionally they are observed within the acini proper. A lesser number of islets are developed from the larger ducts similar to those formed in embryonic periods from the pancreatic tubules. Some evidence indicates that the secondary duct system, or tubules, actively produce islets in post-natal life. In addition these tubules establish contact with the persisting embryonic islets and contribute cells, particularly of the α type, to the periphery of the islet. The β cell is the only islet cell type to differentiate during embryonic development; β granules are first distinguished in islets during the nineteenth day. Cytological evidence indicates that secretory activity begins in the β cells on the twenty-first day. This is limited to exceedingly few cells and no conspicuous increase in secretory activity occurs until parturition. Instead the majority of cells are in the production and storage phases of the cycle. Alpha cells are first recognized during the second day of post-natal life. The number of cells is exceedingly small per islet and they contain small but variable quantities of granules. Some α cells appear to be actively secreting by the fifth day of post-natal life. Secretions from the β cells may play some part in embryonic metabolism after the twentieth day of embryonic development. Evidence would indicate that the majority of β cells do not secrete until after birth. Obviously the α cell plays no part in fœtal metabolism, since it does not differentiate during preparturitional development. The cytological evidence for this type of cell would indicate that it plays little part in metabolism until the fifth day *post partum*.

Structure and Connexions of Venous Sinuses in the Spleen.

T. SNOOK (*The Anatomical Record*, August, 1944) gives an account of a wax plate reconstruction showing a portion of the venous sinus network of the spleen of the guinea-pig. The spleen of this animal was chosen as it is similar in structure to the human spleen. The sinus system consists of a series of completely patent anastomotic channels which are drained at various points by collecting veins. An especially large set of sinuses "embraces" each lymphatic nodule. Arterial capillaries have been observed to open directly into sinuses. Other connexions by way of fenestrated arteriolar terminations are also illustrated. Contrasts between the intermediate circulation in spleens of the guinea-pig type and the cat and mouse type are discussed. Similarities between the human and guinea-pig spleens are stressed.

Studies on Anatomy of the Tongue.

H. S. FISH *et alii* (*The Anatomical Record*, August, 1944) state that recent developments in the field of nutrition have given a renewed impetus to the study of the anatomy and physiology of the tongue. The tongue undergoes marked changes during various dietary disturbances and deficiencies, and experimental studies have shown that in a wide variety of glandular and nutritional disturbances animals are able to make beneficial dietary selections from foodstuffs. The results of these studies indicate that appetite of animals may be used as a guide to dietary deficiencies. The importance of the tongue in making these selections is attested by the fact that section of the taste nerves greatly reduces or completely abolishes this ability. In an effort to throw light on these phenomena, the authors have undertaken a series of studies on the anatomy and physiology of the tongue of animals and man. The present report deals largely with the superficial anatomical characteristics of the rat's tongue, the epithelial covering, and the number, shape and distribution of the papillæ.

The Relation between Vulva Size and Fertility in the Vixen.

O. P. PEARSON AND C. F. BASSETT (*The Anatomical Record*, August, 1944) find that vulva size in the vixen was related to the number of pups per mated female, to failure to whelp, to the survival of litters and probably to the size of litters. Superior performance was associated in each case with large vulva size.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on May 24, 1945, at the Royal Prince Alfred Hospital, Sydney. The meeting took the form of a series of clinical demonstrations by members of the honorary medical staff of the hospital. Part of this report was published in the issue of August 4, 1945.

Extramedullary Meningioma of the Cord.

DR. R. A. MONEY showed a female patient, aged fifty-two years, suffering from extramedullary meningioma of the cord. The patient had been referred to Dr. Kempson Maddox. She had complained of stiffness in her legs, of difficulty in walking, and of cramps, of about twelve months' duration. She had also noticed disturbances in sensation below both knees for about nine months and recently constipation had been a feature.

On examination of the patient, some wasting was noted in the muscles of the right calf, and there was loss of power in flexion of the left thigh. Her gait was spastic and she was unable to walk without assistance. Anæsthesia and analgesia were present below both knees. The tendon reflexes in both lower limbs were exaggerated, and patellar and ankle clonus was present. The plantar response was extensor in type in both feet. Spinal puncture yielded clear fluid at a pressure of 70 millimetres. The Queckenstedt test produced a positive result, but the protein content of the cerebro-spinal fluid was increased to 150 milligrammes *per centum*. Ordinary skiagrams of her spine revealed no abnormality, but those taken after the injection of lipiodol showed that it was completely held up at the level of the twelfth thoracic vertebra.

Laminectomy was then performed, and a solid tumour the size of an almond was found growing from the *dura mater* between two emergent nerve roots at the level indicated by the lipiodol. It was badly compressing the cord and had to be removed piecemeal. Pathological examination showed it to be the psammomatous type of meningioma. Convalescence was uneventful, and at the time of the meeting the patient was walking well with the aid of a stick.

Fracture of the Thoracic Part of the Spine with Paraplegia.

Dr. Money's next patient was a male, aged nineteen years, suffering from a compression fracture of the thoracic portion of the spine with paraplegia. Some three months before being examined by Dr. Money in consultation at another hospital, the patient had been involved in a motor-cycle accident. Immediately after the injury complete paraplegia and anæsthesia had been found below the level of the seventh thoracic dermatome. Skiagrams of his spine revealed partial compression of the seventh thoracic vertebra with complete compression of the eighth thoracic vertebra and an acute kyphosis at this level. At that time incontinence of overflow of his bladder developed, and infection of his urinary tract followed upon intermittent catheterization; decubitus ulcers rapidly appeared over his sacrum and both trochanters. The orthopædic specialists to the hospital had regarded his condition as hopeless, and no attempt at reduction or fixation had been made. He was then transferred to the neurosurgical department of the Royal Prince Alfred Hospital, where tidal drainage of his bladder was arranged; but this means his bladder was emptied at regular intervals and kept regularly flushed with antiseptic solution between times. A course of sulphathiazole treatment was also started, as his urine contained a large amount of pus and several different types of organisms. He was nursed in the prone position so that treatment could be given to his decubitus ulcers. He had intermittent elevations of temperature with evening rises to between 102° and 103° F., and was very ill. Paraplegia was still present when he was in extension, but the spasticity was not pronounced and spontaneous flexor spasms occurred at frequent intervals. Hyperæsthesia was present at the sixth and seventh thoracic dermatomes and complete anæsthesia below this level. Spinal puncture was performed. The pressure of the cerebro-spinal fluid was 190 millimetres and its protein content was 300 milligrammes *per centum*. On compression of both jugular veins in the neck no rise occurred in the fluid level in the manometer; this indicated a complete block to the subarachnoid space at the level of the injury.

Some three weeks or so later laminectomy was performed, by removal of the spines and laminæ of the sixth, seventh, eighth and ninth thoracic vertebræ until the *dura mater* was exposed. The spinal cord was found to be compressed and crushed between the lamina of the seventh thoracic vertebra and the crushed body of the eighth thoracic vertebra, which was displaced posteriorly to push backwards in front of the cord. Sufficient bone was removed posteriorly to relieve pressure, but no attempt was made to reduce the anterior deformity. After these procedures general improvement occurred in the patient's condition, especially in regard to the trophic functions of the paralyzed area, and the ulcers began to heal. The indwelling catheter, however, caused urethritis and epididymo-orchitis, so that suprapubic cystostomy had to be performed and an indwelling De Pezza catheter inserted. Thereafter his condition greatly improved and his temperature became normal. Dr. Money said that although the outlook for any return of function below the level of lesion in this patient was extremely poor, yet there had been a remarkable change in his psychological outlook and his physical state, and with the help of suitable occupational therapy and the learning of a trade which would involve only manual dexterity, he might yet become a useful citizen.

Chondrosarcoma of the Spine.

The next patient shown by Dr. Money was a male, aged thirty-two years, who had complained of shooting pains around the right side of his body about the nipple line intermittently for five years. Some four or five weeks prior to his admission to hospital he had visited his own doctor, Dr. Alan B. S. Owen, suffering from an attack of bronchitis, and during the examination Dr. Owen noticed the presence of swelling in the vicinity of the angles of the fifth and sixth ribs on the right side. Skiagrams taken of this area indicated the presence of a large chondrosarcoma involving these ribs and the associated vertebræ.

The patient was referred for a course of deep X-ray therapy. After several treatments he began to suffer from weakness with numbness and tingling of his legs. The girdle pains became greater and involved both sides of his body. Difficulty in micturition also appeared. These symptoms gradually became worse during the next four weeks, and when he was admitted to the neurosurgical department he had spastic paraplegia with pronounced loss of sensation below the seventh thoracic dermatome and retention of urine. A hard, irregular, immobile tumour about three inches in diameter was lying over the angles of the fifth and sixth ribs on the right side, and some prominence of the fifth and sixth thoracic spines at the site of the lesions was shown in the skiagrams.

Spinal puncture was performed, and Queckenstedt's test produced a negative result; this indicated the presence of a subarachnoid block at the site of the tumour. The protein content of the cerebro-spinal fluid was increased to 150 milligrammes *per centum*. Laminectomy and thoracotomy were then performed, and as much as possible of the tumour with the involved ribs and vertebræ was removed by curettage until the pressure was released from the *dura mater*. Convalescence was prolonged but uneventful. Spinal puncture one month after operation yielded clear cerebro-spinal fluid, and the protein content was only twenty milligrammes *per centum*; Queckenstedt's test now produced a positive result, which indicated removal of the compression. Pathological examination of the portions of the tumour removed showed it to be a chondrosarcoma. Dr. Money said that this type of tumour did not respond to X-ray treatment, and as complete removal was not possible, the ultimate prognosis was not very good; but at the time of the meeting the patient was able to walk about unaided and had complete control over his bladder.

Bullet Wound of the Spine with Partial Lesion of the Cord.

Dr. Money's next patient had sustained a bullet wound over his spine with a partial lesion of the cord. He was a male, aged sixteen years, who had been accidentally shot in the right side of his neck with a 0·22 calibre bullet. He had not lost consciousness, but had dropped to the ground immediately and become completely paraplegic in both lower limbs, and had had paresis in both upper limbs. When he was examined twenty-four hours later, root pains were present on both sides in the distribution of the first, second and third thoracic dermatomes; all sensations had been lost below the second thoracic dermatome on the left side and below the ninth thoracic dermatome on the right side. Horner's syndrome was noticed in the right eye. The tendon

reflexes were present in both arms and in the left lower extremity; they were absent in the right lower extremity. Skiagrams showed the bullet buried in the posterior aspect in the body of the second thoracic vertebra, and protruding slightly into the spinal canal, just to the right of the middle line.

Next day some return of movement was noted in the left lower limb, and there was dissociation of sensation below the level of the second thoracic dermatome, typical of the Brown-Séquard syndrome. Retention of urine and abdominal distension were present. Spinal puncture was then performed and slightly xanthochromic fluid was obtained under normal pressure. Queckenstedt's test produced a positive result, the pressure rising rapidly to 185 millimetres on compression of the jugular veins. This showed that there was not a complete subarachnoid block at the level of the lesion, and, in view of the recovery which was already occurring, it was decided not to operate. Tidal drainage of the bladder was commenced and a course of sulphathiazole treatment was started by mouth. Thereafter progressive gradual return of power and sensation took place. Normal bladder function was regained in two weeks, and at the time of the meeting the patient was able to walk with the aid of a stick. Slight spasticity was present in the right lower limb with some ankle clonus, and sensation to pain, heat and cold had been lost in the left side of his body and left lower limb; coordination was defective and the plantar reflexes were extensor in type. Dr. Money said that, in view of this patient's satisfactory progress to date, and of the absence of signs of compression or of interference with the flow of cerebro-spinal fluid past the site of the injury, there was no indication at present to attempt to remove the foreign body. Should any retrogression occur, or should other signs and symptoms appear, the decision might later have to be reviewed.

Bullet Wound of the Neck: Partial Lesion of the Brachial Plexus.

Dr. Money's next patient was a male, aged eighteen years, who had sustained a bullet wound of the neck with a partial lesion of the brachial plexus. About six weeks prior to being examined he had been accidentally shot in the right side of the neck by a 22 calibre bullet. His right arm became paralysed at once, and pain was felt in the right upper limb from the elbow to the fingers. He did not lose consciousness, nor had there been any evidence of damage to the spinal cord. Thereafter, gradual recovery had occurred in the right upper limb, except for some weakness in movement at the shoulder joint and paræsthesia on the posterior aspect of the right forearm and thumb.

On examination of the patient, the scar of the entry wound was seen in the middle of the posterior triangle of the neck on the right side. The bullet could be felt under the skin in the anterior part of the posterior triangle on the left side, and it had apparently completely traversed the neck. Paralysis of the right *serratus anterior* muscle and paresis of the right *latissimus dorsi*, infraspinatus and portion of the triceps muscles on the right side were present. There was hypæsthesia in the area of distribution of the superficial branch of the radial nerve on the dorsal aspect of the thumb and forearm. Skiagrams showed portions of the bullet just to the left of and in front of the intervertebral disk between the fifth and sixth cervical vertebræ, with damage to the bodies of both these vertebræ. Dr. Money said that the bullet must have traversed the neck just behind the œsophagus at this level, and it was amazing to think so little damage had been done. The patient had been treated by physical therapy for about six weeks, and further improvement had occurred. Should the *serratus anterior* muscle remain paralysed, exploratory operation to suture the cut ends of the long thoracic nerve might be indicated.

Plexiform Neuroma of the Lumbo-Sacral Region.

The last patient shown by Dr. Money was a male, aged twenty-one years, suffering from plexiform neuroma of the lumbo-sacral region. This patient had complained of pain in the lumbar region for a period of five years; the pain had recently extended down the back of the right lower limb, and some weakness there had been noted.

On examination of the patient, a large, irregular, puffy tumour about the size of the palm of the hand was detected in the subcutaneous tissues over the fourth and fifth lumbar vertebræ and for some distance to each side of the mid-line. It was tender on palpation and the pain radiated down the lower limbs. There was no actual loss of motor power or sensation in the lower limbs, and no indication of any effect on the spinal cord. At operation a wide and extensive dissection of the subcutaneous tissues and lumbo-dorsal fascia containing the tumour was carried out. Convalescence was uneventful, and the symptoms in the back and lower limbs had been relieved. Pathological examination of the tumour, which was exhibited at the meeting, showed that it consisted of fibrous nodules similar to those found in von Recklinghausen's disease; some young tissues resembled irregular masses of sympathetic nerves.

Klippel-Fiel Syndrome.

DR. L. J. WOODLAND showed a male child, aged nineteen months, suffering from the Klippel-Fiel syndrome. The patient was the second child in a family of three. There was no history of familial abnormality. The parents had noticed that the movements of his neck had always been restricted. He had sat up at the age of eight months, and had commenced to walk at the age of eighteen months. At the time of the meeting he could say a few words, and had complete control of his bladder.

Examination of the patient revealed a short neck with consequent low hair line. Slight torticollis was present, the head being tilted to the left. Movements of the neck were restricted in all directions to about one-third of the normal range. X-ray examination revealed considerable congenital abnormality of the cervical vertebræ, with *spina bifida* in the upper thoracic vertebræ.

Dr. Woodland mentioned that this syndrome of fusion of the lower cervical vertebræ associated with *spina bifida* and similar changes in the upper dorsal vertebræ, was sometimes associated with torticollis, asymmetry of the face, scoliosis of the dorsal part of the spine, nystagmus, lesion of the nerves of the upper extremity, progressive spastic paraplegia, sphincter disturbances, neurotrophic joints and deformity of the shoulder and the upper limb bones. He said that in the differential diagnosis of "short neck", *pterygium colli*, platybasia, congenital synostosis of the neck and bilateral Sprengel's shoulders should be considered.

Giant-Cell Tumour of the Tarsus.

Dr. Woodland then showed two patients with giant-cell tumours of the tarsus. The first patient, a male, aged twenty-six years, was shown with the permission of Dr. Lennox Teece. The patient gave a history of an ache in the front of the left ankle, of two months' duration. Clinical examination revealed no abnormality. X-ray examination revealed a cavity in the head and neck of the talus, about one inch in diameter and surrounded by a narrow zone of sclerosis. Dr. Teece curetted the cavity, which contained straw-coloured fluid, and then filled the cavity with bone chips. Pathological examination of the wall of the cavity revealed a giant-cell tumour. X-ray examination two months after the operation revealed good regeneration of bone. The patient then had a full range of movement without pain.

The second patient, a female, aged thirty-three years, when examined in April, 1945, was four months pregnant. For the past few years she had at intervals "gone over on the left foot"; after this, on each occasion a painful swelling appeared along the medial side of the instep. With rest, the pain and swelling subsided in three or four days. Since November, 1944, she had noticed that the pain occurred whenever she walked without a shoe.

On examination of the patient, the paramalleolar pads of fat were seen to be large in both feet. In the left foot the medial pad of fat extended forward over the medial side of the instep. She complained of tenderness on pressure over this pad. X-ray examination revealed decalcification of the medial half of the navicular without sclerosis.

Whilst the patient was awaiting admission to hospital, the pain became so severe that she was unable to walk. X-ray examination in May revealed extension of the area of destruction in the navicular, together with a fracture through the base of the tubercle. Some redness of the skin was observed over the navicular and talus. Considerable tenderness of the tubercle of the navicular was present. All movements of the ankle and tarsus were about half the normal range, and were painful.

Dr. Woodland said that at operation the navicular bone, which had been largely replaced by a soft, gelatinous, pinkish material, was removed piecemeal. The articular cartilage was intact. The foot and leg were placed in a plaster cast, which was to be maintained until after the patient's confinement. If there was any sign of recurrence, deep X-ray therapy would be used. Pathological examination revealed a cellular neoplasm with many large osteoclast-type giant cells, much active spindle-cell tissue and many round cells.

Dr. Woodland said that these two cases illustrated the two types of giant-cell tumour, the cystic and the cellular.

They also illustrated a clinical feature of giant-cell tumours—namely, the slightness of the symptoms until fracture occurred.

Radial Nerve Paralysis.

Dr. Woodland's next patient was a baby, aged one year, who had been born with an abrasion about one inch in diameter situated over the lateral aspect of the left arm at the junction of the lower one-fourth and the upper three-fourths. This abrasion was associated with left wrist drop. The baby, the parents' first-born, had presented by the head. The obstetrician had induced labour by bougies, which were left *in utero* for twenty-four hours. Labour was not difficult. Dr. Woodland examined the baby two days after birth. An indurated mass, about one cubic inch in capacity, was present beneath the abrasion on the arm. There was complete paralysis of all muscles supplied by the radial nerve except the triceps. In the course of a few days the abrasion ulcerated deeply, and did not heal for two months. The forearm and hand were rested in a cock-up splint, and in four months full recovery of the radial nerve had occurred.

Dr. Woodland mentioned that he had subsequently seen another baby born with a radial nerve paralysis; labour in this case had not been induced. A similar, but smaller, area of induration had been present in the arm; it resolved in about three weeks without ulceration. In this case full recovery of function occurred in two months.

Foreign Bodies in the Knee Joint.

Dr. Woodland's final patient was a boy, aged twelve years, who gave a history of having fallen on some rocks and struck his left knee about six weeks prior to his admission to hospital. He could not stand on his left leg after the accident. There was a wound about one inch long on the outer side of the knee, which healed in two weeks. The day after the accident the knee was swollen, red and painful. The swelling and pain subsided with rest, but recurred when he walked about.

On examination, moderate generalized swelling of the knee with faint excess free fluid was found. The patient complained of slight tenderness all over the knee joint. The range of active movements was 175° to 45°. He walked with a pronounced limp. His temperature varied from 99° to 99·5° F. X-ray examination revealed one foreign body in the antero-lateral part of the knee joint, one foreign body in the postero-medial part of the knee, and one foreign body in the postero-lateral compartment of the knee. These foreign bodies were removed through an antero-lateral incision and a Bracket's popliteal incision, and were found to be pieces of glass each about half an inch square. The articular surface of the lateral condyle of the femur was found to be eroded by the anterior piece of glass, which was free in the front of the joint. The other two pieces had apparently passed through the intercondylar fossa, one into the postero-medial and the other into the postero-lateral recess. Dr. Woodland said that the fortunate feature was that the glass was radio-opaque.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on May 9, 1945, at the Children's Hospital, Melbourne, DR. ERIC PRICE, the President, in the chair.

Intestinal Obstruction Treated by Bowel Resection.

DR. JOHN BEGG showed a male child, aged six years, on whom he had performed a bowel resection operation. The boy had been admitted to hospital on October 27, 1944, suffering from acute appendicitis of a few hours' duration. He was operated on and an acutely inflamed appendix, which was surrounded by a small abscess, was removed without difficulty. He made an uninterrupted recovery, and was discharged to his home on November 3, 1944. Three and a half months later, on February 21, 1945, he was readmitted to hospital with a history of acute abdominal pain and vomiting of three days' duration. He had received a kick on the abdomen the previous day.

On examination, the boy was pale, sunken-eyed and drowsy; his tongue was furred and his breath fœtid. His abdomen, which was only slightly distended, did not move on respiration, and was generally rigid and tender, the signs being most pronounced in the right lower quadrant. A provisional diagnosis of acute strangulation and obstruction was made, and operation was decided upon. When the abdomen was opened through a right lower paramedian incision, heavily blood-stained fluid with a slightly fæcal odour escaped. A loop of black bowel about eighteen inches long and greatly distended was delivered through the wound, from the right iliac fossa. This loop was constricted at its base by a band which passed from the site of the removal of the appendix to a neighbouring coil, and proved to be the terminal eighteen inches of the ileum. The gangrene apparently extended right down to the ileo-caecal junction and precluded the performance of a resection and end-to-end anastomosis, even had the child's condition warranted such a procedure. The bowel had the characteristic blackish-green colour and soft flaccid feel of gangrene. It was thought that the best means of dealing with this situation was the performance of an ileo-transverse colostomy. The transverse colon was delivered forthwith, and at a suitable spot about its middle was anastomosed by a generous stoma to the ileum about nine inches above the gangrenous loop. The gangrenous loop was then exteriorized, and the peritoneum was closed snugly around it. The child was returned to bed, his fluid and electrolyte balance was adjusted by the continuous intravenous administration of saline solution, suitable doses of morphine were administered and continuous gastric suction and the intranasal administration of oxygen were commenced. Penicillin, in doses of 10,000 units every three hours, to combat the infection present was given by the intramuscular route. With this treatment the child's condition greatly improved, distension was not a pronounced feature, and that most favourable of all signs, a spontaneous bowel action, was obtained.

On February 23, two days after his first operation, he was again taken to the operating theatre, and without anæsthesia the gangrenous loop was amputated and an endeavour made to unfold the proximal and distal openings in the bowel. This was done extraperitoneally, and by this means it was rather vainly hoped to prevent the development of a small bowel fistula, with its attendant evils of dehydration and digestion of the anterior abdominal wall. The combination of infection in the wound and the pressure within the bowel proved too much for the rather insecure suturing possible in the circumstances, and on February 26, three days after the second operation, bowel contents commenced to be discharged on to the abdomen through the now open end of the ileum. Natural bowel actions were at this time also occurring, proving the adequacy of the ileo-transverse colostomy. The child's general condition now steadily improved; the administration of fluids and later food was commenced by mouth, and in due course the intravenous administration of fluid and the continuous gastric suction were dispensed with. The penicillin therapy was stopped after a total of 700,000 units had been given over a period of five days. The small bowel fistula, though discharging surprisingly solid contents, began to produce its usual digestive effect on the wound and surrounding abdominal wall, and the problem now resolved itself into that of closing the fistula. Two alternatives offered themselves: (i) the resection of the nine inches of ileum between the fistula below and the ileo-transverse colostomy above, the distal end of the ileum being turned in flush with the anastomosis, so that there was no blind spur left beyond it, which the continual thrust of the intestinal contents might dilate into a sac capable of giving trouble in the future; (ii) the anastomosis of the distal end of the ileum with the caecum or the ascending colon, the normal anatomy being restored as far as possible.

The first of these alternatives—namely, that of resecting the ileum back flush with the ileo-transverse colostomy—appeared to offer greater hope of a secure and permanent closure of the fistula, but had the disadvantage of leaving a long blind loop of colon between the anastomosis and the caecum, which might become distended with fæces by reverse peristalsis, form a troublesome tumour and require a right hemicolectomy for its cure. Dr. Begg said that he was surprised at the divergent opinions expressed by various eminent surgeons whose advice he sought as to the probability that this might occur. Since the boy's future seemed to be better assured if no long blind loop was left, the second alternative of anastomosing the lower end of the ileum with the caecum or ascending colon was decided upon. On March 14, three weeks after the resection of the gangrenous loop, the original wound was opened, and the fistulous spur of the ileum as well as the caecum and the lower portion of the ascending colon were freed of adhesions and brought into the wound, care being taken to disturb

the adhesions shutting off the general peritoneal cavity as little as possible. Actually, it was found, when the parts were displayed, that a half-inch of the ileum distal to the strangled loop had survived, and presented itself in a convenient way for an end-to-end anastomosis to be made. This was done forthwith, and the peritoneal cavity was closed with a glove drain leading down to the site of the anastomosis. Convalescence was uneventful, and no further faecal leak occurred, so that the excoriation which was becoming troublesome rapidly cleared up. The patient had been readmitted to hospital since his discharge for one attack of abdominal pain, which was promptly relieved by a soap and water enema, and was possibly due to injudicious feeding. Dr. Begg said that, in common with other people who had had extensive intraperitoneal procedures performed, the patient had to be regarded as a possible candidate for further attacks of obstruction.

Dr. Begg said that he wished to bring out the several points from this case. The diagnosis in the early stages might be extremely difficult; but if it was borne in mind that anyone who had a scar on the abdomen and presented the triad of symptoms—abdominal pain, vomiting and constipation—must be regarded as suffering from an intestinal obstruction until it was proved otherwise, there would be fewer patients requiring bowel resections. In this particular case an effective red herring was drawn across the trail in the shape of the blow which the child had received on the abdomen. He was actually well enough to attend school until a day before his admission to hospital. Dr. Begg said that it was in connexion with the views expressed on the problem of dealing with non-viable or doubtfully viable gut that he would most welcome criticism and comment, so that when the occasion arose again, he might have clear-cut ideas as to the best procedure to adopt. Resection and end-to-end union, owing to the anatomical situation of the strangled loop, was not possible in this case; but in those in which it was possible, it had to be remembered that this procedure carried with it an over-all mortality rate of about 50%, and any procedure carrying such a mortality rate must make surgeons pause and consider what other alternatives were available. Exteriorization of the devitalized bowel carried a much lower immediate mortality rate, and had the added advantage that if the bowel was found to have recovered next day, it might with reasonable safety be returned to the abdominal cavity. The method was, however, open to the grave objection that a small bowel fistula was practically unavoidable. The closure of this fistula, if it was in the upper part of the ileum or in the jejunum, might well present insuperable difficulties. It could not be done extraperitoneally, and the risks of opening the peritoneal cavity through a digested and sloughing abdominal wall needed no emphasis. If this disadvantage was to be avoided, some form of anastomosis to short-circuit the exteriorized loop would appear to be essential. In the lower portion of the ileum an ileo-transverse colostomy, as had proved successful in this case, was probably the best; but higher up in the bowel the anastomosis had to be made between loops of small gut an ample distance away from the strangled loop. When such a short-circuit functioned successfully, the closure of the fistula formed when the exteriorized loop was amputated might not prove difficult.

Should the general condition of the patient be so desperate as to preclude the performance of any but the simplest procedure, exteriorization of the bowel could be combined with an ileostomy well above the obstruction. If, prior to operation, an indwelling tube, such as the Miller-Abbott tube, had been passed through the pylorus, the ileostomy could be dispensed with. This tube, by decompressing the bowel, enabled the length of small gut intubated to regain its absorptive function, so that nourishment taken by mouth could be absorbed, and the residue sucked back up the tube. It acted in effect as a travelling ileostomy, and might well be a life-saving measure. It was a pity that its use in children was fraught with such practical difficulties; but Dr. Begg could not help feeling that a more determined effort should be made to perfect a technique in its use. It was not used in the case presented because the ileo-transverse colostomy functioned so promptly. Had this not been so effective, Dr. Begg would have made an attempt to induce a tube to pass the pylorus. He had achieved success in this respect in adults by inflating the stomach with air, turning the patient on the right side, and feeding the tube on under fluoroscopic control.

In the event of an exteriorization *plus* ileostomy or indwelling tube being all that the patient could stand, restoration of the continuity of the intestinal tract at the earliest possible time would appear to be indicated. This could be done, not through the original wound with its inevitable infection, but at a point remote from the fistula, with due precautions to avoid infection from it. The exteriorized loop could be identified from within and divided above and below, its two ends infolded, and the continuity of the intestinal tract restored by either end-to-end or side-to-side anastomosis. Subsequent excision of the bilaterally excluded segment could be undertaken at leisure. Primary resection with end-to-end union was probably the most satisfactory procedure to adopt in early cases when the general condition of the patient was good. It should, however, be combined with an ileostomy or the passage of an indwelling Miller-Abbott tube.

Dr. Begg said that cases of intestinal obstruction were an ever-recurring surgical problem. Their early diagnosis might be difficult, and gangrenous bowel might be met with unexpectedly. Prompt and well-judged management was demanded if the unfortunate patient's life was to be saved. Dr. Begg said that he would like to feel much surer than he did at present as to what, in varying circumstances, that management should be.

(To be continued.)

THE QUEENSLAND MEDICAL WAR BENEFIT FUND, 1945.

THE following report is published at the request of Dr. J. G. Wagner, Chairman of Trustees of the Queensland Medical War Benefit Fund, 1945.

The trustees are pleased to report that the fund this year is progressing quite reasonably, although they recognize that a very small proportion of British Medical Association members in Queensland are supporting it.

The maximum amount of benefit paid to any member (and this is to a captain with four or more dependants) is £22 10s. The total monthly benefit paid is £210, divided amongst twelve beneficiaries.

Contributors to the fund are as follows:

K. Aaron, East Brisbane; J. A. Arratta, Muttaburra, Queensland; H. D. Ashton, Jandowae, Queensland; Max Berg, Brisbane; John Bostock, Brisbane; Hedley Brown, Brisbane; A. R. K. Burne, Brisbane; R. N. Burton, Texas, Queensland; A. D. Buchanan, Brisbane; M. W. Carseldine, Brisbane; R. B. Charlton, Brisbane; Shirley Crawford, Brisbane; D. Gifford Croll, Brisbane; Walter Crosse, Brisbane; G. P. Dixon, Brisbane; J. V. Duhig, Brisbane; J. F. Dunkley, Brisbane; P. A. Earnshaw, Brisbane; Milton Geaney, Brisbane; P. B. Guastalla, Surat, Queensland; H. L. Hawthorne, Dalby, Queensland; H. W. Horn, Brisbane; L. T. Jobbins, Brisbane; Horace Johnson, Brisbane; J. K. Joyce, Winton, Queensland; J. R. S. Lahz, Brisbane; Alan E. Lee, Brisbane; Rudolf Levy, Southport, Queensland; Leopold Lofkovits, Brisbane; F. W. R. Lukin, Brisbane; S. F. McDonald, Brisbane; Val. McDowall, Brisbane; A. D. McKenzie, Toowoomba, Queensland; W. F. Machin, Clifton, Queensland; W. A. Mackey, Southport, Queensland; T. M. Mansfield, Brisbane; Alex. H. Marks, Brisbane; E. O. Marks, Brisbane; A. V. Meehan, Brisbane; C. C. Minty, Brisbane; G. C. Morrisey, Ingham, Queensland; Alex. Murphy, Brisbane; W. H. Nette, Biggenden, Queensland; L. J. J. Nye, Brisbane; J. M. O'Connor, Brisbane; S. V. O'Regan, Mundubbera, Queensland; Alex. E. Paterson, Brisbane; M. S. Patterson, Brisbane; T. A. Price, Toowoomba, Queensland; John Power, Brisbane; A. D. D. Pye, Brisbane; W. H. N. Randall, Dalby, Queensland; Christine Rivett, Brisbane; A. S. Roe, Brisbane; A. C. Roper, Charleville, Queensland; K. B. Shallard, Coolangatta; J. Lloyd Simmonds, Brisbane; Clive Sippe, Brisbane; J. Muir Smith, Esk, Queensland; J. E. Streeter, Brisbane; Neville G. Sutton, Brisbane; G. C. Taylor, Brisbane; J. G. Wagner, Brisbane; D. I. Wagner, Brisbane; H. Stanley Waters, Brisbane; E. R. Watkins, Mount Morgan, Queensland; H. J. Windsor, Brisbane; L. P. Winterbotham, Brisbane; N. V. Youngman, Brisbane.

Post-Graduate Work.

COURSE IN MEDICINE AT SYDNEY.

THE New South Wales Post-Graduate Committee in Medicine desires to announce that a practical course in medicine will be held from September 3 to 22, 1945. Attendance is limited to twenty and preference will be given to

members of the correspondence course in medicine who are candidates for the September examination for membership of the Royal Australasian College of Physicians.

The fee for the course is seven guineas (£7 7s.), and applications to attend should be forwarded as soon as possible, together with the amount of the fee, to the Secretary of the Committee at 131, Macquarie Street, Sydney. Telephone: B 4606.

The programme is as follows:

Monday, September 3.

10 a.m.—Pathology: Dr. F. B. Byrom, Pathology Department, the University of Sydney.
2 p.m.—"Drug Eruptions and the Effect of Endocrine Disturbances as Manifested in the Skin": Dr. E. H. Molesworth, the Stawell Memorial Hall, 145, Macquarie Street, Sydney.
8.15 p.m.—"The Background of Infectious Diseases in Man"—Lecture 1: Professor F. M. Burnet, Director of the Walter and Eliza Hall Institute of Research, Melbourne, the Stawell Memorial Hall.

Tuesday, September 4.

At 113th Military Hospital, Concord.

10 a.m.—Demonstration of cases: Sir Charles B. Blackburn.
2 p.m.—Demonstration of cases: Lieutenant-Colonel Bruce Hall.

Wednesday, September 5.

At Royal North Shore Hospital.

10 a.m.—Demonstration of Congenital Heart Diseases: Dr. B. Shallard.
11.30 a.m.—"Diabetes": Dr. W. W. Ingram.
2 p.m.—Chest Clinic: Dr. Bruce White.
2.45 to 3.30 p.m.—Chest Clinic. Dr. M. Susman.

At the Stawell Memorial Hall.

4.30 p.m.—"The Background of Infectious Diseases in Man"—Lecture 2: Professor F. M. Burnet.

Thursday, September 6.

At the Prince Henry Hospital.

10 a.m.—"Hæmatology": Dr. E. B. Jones. Examination of cases.
2 p.m.—Demonstration of cases: Dr. S. A. Smith.

Friday, September 7.

10 a.m.—Pathology: Dr. F. B. Byrom, Pathology Department, the University of Sydney.
2 p.m.—Demonstration of Fundi: Dr. N. McAlister Gregg, the Royal Prince Alfred Hospital.
4.30 p.m.—"The Background of Infectious Diseases in Man"—Lecture 3: Professor F. M. Burnet, the Stawell Memorial Hall.

Monday, September 10.

At the Prince Henry Hospital.

10 a.m.—Examination of cases.
2 p.m.—Demonstration of cases: Dr. Harold Ritchie.

At the Stawell Memorial Hall.

4.30 p.m.—"The Background of Infectious Diseases in Man"—Lecture 4: Professor F. M. Burnet.

Tuesday, September 11.

At 113th Military Hospital, Concord.

10 a.m.—Demonstration of cases: Sir Charles B. Blackburn.
2 p.m.—Demonstration of cases: Lieutenant-Colonel Bruce Hall.

Wednesday, September 12.

10 a.m.—Pathology: Dr. F. B. Byrom, Pathology Department, the University of Sydney.
2 p.m.—Demonstration of Fundi: Dr. C. Cohen, Eye Department, Sydney Hospital.

At the Stawell Memorial Hall.

4.30 p.m.—"The Background of Infectious Diseases in Man"—Lecture 5: Professor F. M. Burnet.

Thursday, September 13.

At the Pulmonary Clinic, Sydney Hospital.

10 a.m.—Demonstration of cases: Dr. E. H. Stokes.

At the Stawell Memorial Hall.

2 p.m.—Electrocardiograms: Dr. John Halliday.
4.30 p.m.—"Closed Head Injuries and Cerebral Contusion": Surgeon Captain Lambert Rogers, R.N.V.R., Consultant in Neurosurgery to the Royal Navy; Professor of Surgery, University of Wales.

Friday, September 14.

At the Royal Alexandra Hospital for Children.

10 a.m.—Pathology demonstration: Dr. Douglas Reye.
11.15 a.m.—"Acute Rheumatism": Dr. L. H. Hughes.
2 p.m.—"The Anæmias": Dr. Lorimer Dods .

At the Stawell Memorial Hall.

4.30 p.m.—"The Background of Infectious Diseases in Man"—Lecture 6: Professor F. M. Burnet.

Monday, September 17.

At the Prince Henry Hospital.

10 a.m.—Examination of cases.
2 p.m.—Demonstration of cases: Dr. H. Ritchie and Dr. S. A. Smith.

Tuesday, September 18.

At the Pathology Department, the University of Sydney.

10 a.m.—Pathology: Dr. F. B. Byrom.

At the Royal Prince Alfred Hospital.

2 p.m.—Demonstration in clinical pathology: Dr. E. Day.
3 p.m.—Ward rounds: Dr. C. G. McDonald.

Wednesday, September 19.

At the Royal Prince Alfred Hospital.

10 a.m.—Demonstration of bronchoscopy: Dr. H. Maynard Rennie.
11.30 a.m.—Demonstration of cases of intracranial tumour: Dr. R. A. Money.
2 p.m.—Demonstration in clinical pathology: Dr. E. Day.
3 p.m.—Details will be announced later.

Thursday, September 20.

At the Pathology Department, the University of Sydney.

10 a.m.—Pathology: Dr. F. B. Byrom.

At the Royal Prince Alfred Hospital.

2 p.m.—Demonstration in clinical pathology: Dr. E. Day.
3 p.m.—Ward rounds: Dr. A. J. Collins, Dr. L. H. Hughes.

Friday, September 21.

At the Broughton Hall Psychiatric Clinic, Leichhardt.

9.30 a.m.—Demonstration of cases: Dr. S. Evan Jones.

At the Royal Prince Alfred Hospital.

2 p.m.—Demonstration in clinical pathology: Dr. E. Day.
3 p.m.—Ward rounds: Dr. T. M. Greenaway, Dr. J. Halliday.

DEMONSTRATIONS IN MELBOURNE.

THE Melbourne Permanent Post-Graduate Committee announces the following programme for September, 1945:

Clinical demonstrations suitable for candidates presenting themselves for the M.S. examination, Part II, and the F.R.A.C.S. examination will be held on Tuesdays at 2.15 o'clock p.m. September 4, by Dr. C. H. Hembrow at the Alfred Hospital. September 11, by Dr. Paul Jones at the Royal Melbourne Hospital, E.2. September 18, by Dr. Anthony Kelly at Saint Vincent's Hospital. September 25, by Dr. John Turner at the Royal Melbourne Hospital, E.8. These demonstrations will be continued each week.

Clinical demonstrations suitable for candidates presenting themselves for the M.D. examination, Part II, and M.R.A.C.P. examination will be held on Thursdays at 2.15 o'clock p.m. These will be followed by pathological demonstrations at 5 p.m.

A series of neurological clinico-pathological demonstrations will be conducted by Dr. E. Graeme Robertson in the lecture theatre, Royal Melbourne Hospital, on Fridays at 12 noon, commencing September 21. There will be nine demonstrations.

Enrolments for these courses should be made with the Secretary, Post-Graduate Committee, College of Surgeons, Spring Street, C.1.

Correspondence.

THE PREVENTION OF FRACTURES DURING SHOCK THERAPY.

SIR: As it has been my misfortune to see a number of fractures caused by "shock therapy", may I through your columns tender a few suggestions for the consideration of those members of the profession who indulge in this comparatively new remedy.

The majority of such fractures occur in the spine as compression fracture of the one or more vertebral bodies—as a result of strong forward flexion of the patient during spasm—and in the upper end of the humerus, probably during violent abduction spasm of the arm.

Perhaps the following measures would lessen the incidence of such fractures. (*a*) The application of a Thomas spinal brace or a plaster of Paris jacket just before the injection is given or the current is induced. The plaster jacket could be made several days beforehand and be made removable, so that it could be quickly taken off should respiratory embarrassment develop. Such a jacket should not be made to fit too snugly and should be well padded at the edges. (*b*) The application of a modified straitjacket of canvas to hold the arms fairly closely, but not too firmly, to the sides, in order to prevent uncontrolled movement of the arms.

I would appreciate comments by the psychiatrists apropos to these suggestions.

Yours, etc.,

A. R. HAMILTON.

British Medical Association House,
135, Macquarie Street,
Sydney.
August 1, 1945.

PHYSIOLOGICAL CONSIDERATIONS IN VASCULAR SURGERY.

SIR: I am sorry that Mr. Lahz has intruded refrigeration anæsthesia upon the question of optimum limb temperature after arterial ligation. The two are obviously not comparable. In the first, the limb is packed in ice for three hours, and the surgeon removes the vulnerable parts. In the second, the limb is packed in ice for days, until an effective collateral circulation develops, and the surgeon attempts to preserve the vulnerable parts.

Of late, surgical literature has been overfilled with personal experiences in therapy, which are philosophically valueless and statistically insignificant, with experimental conditions unstandardized (for example, vitality of subject, anatomy of vessels, severity of wound *et cetera*), and with no regard to controls. Such violation of scientific methods is hard to avoid in evaluating therapy. But it is responsible for much that is ephemeral and ridiculous. The use of histidine for peptic ulcers is a recent example, and a later one is the *volte-face* since Pearl Harbour over the local use of sulphonamides in wounds.

Is it any wonder that many people would try to follow Hunter and seek for guidance from broad biological principles? It was with this aim, and not in any spirit of flippancy, that I mentioned my broad beans. They reminded me that the survival of the more highly organized living things, plant or animal, is threatened by violent changes in environment. The hardy organism with unimpaired vitality is most likely to survive. The wounded limb with recently ligated main artery is at a disadvantage. An efficient vascular reaction is a necessary part of the tissue defence against noxious influences of all kinds, including cold. Lewis points out: "If a normal finger is placed in ice-cold water for ten minutes and is withdrawn, in a short time the finger is found to be much hotter than its fellows; this reaction is dependent upon the axon reflex under consideration. The reaction to cold is a very important one in helping to maintain finger temperature and in protecting against the effects of cold, for the response occurs, not only in ice, but to cooling of much less degree (to 18° C. or about 64° F.)" ("Vascular Disorders of the Limb", page 102). Cold, even short of freezing, menaces the limb which has a "poor circulation". Since my last letter on this subject I have seen, by courtesy of Dr. John Hardie, a girl with near ulceration due to *erythrocyanosis crurum puellarum frigida*, a condition caused by cold, in limbs of "poor circulation". Both this condition and chilblains may go on to ulceration.

In conclusion, I would again question the wisdom of packing the stricken limb in ice, if hopes are still entertained for its survival.

Yours, etc.,

V. J. KINSELLA.

235, Macquarie Street,
Sydney,
August 11, 1945.

Obituary.

OWEN UPTON WILLIAMS.

Lieutenant-Colonel R. S. Smibert, Lieutenant-Colonel C. H. Selby, Lieutenant-Colonel J. J. Ryan and Major D. W. Macpherson have forwarded the following appreciation of the late Captain Owen Upton Williams, A.A.M.C.

The death by enemy action of Captain Owen Williams, aged twenty-seven, on July 3, 1945, was felt as a personal loss by every man and officer of his battalion. In the present campaign Captain Williams had on numerous occasions exposed himself to snipers and ambushes to attend to wounded, and his devotion to his task and his men caused him to continue to do so in spite of many narrow escapes from enemy fire. It was not only his personal bravery that made him, in our opinion, the ideal regimental medical officer. He had a quiet charm of manner and had gained the confidence and admiration of all the infantry troops with whom he came in contact to a greater degree than we have seen before. The profession can be proud of Captain Williams, who indeed lived up to its highest ideals.

THOMAS WHITECROSS HOGARTH.

WE regret to announce the death of Dr. Thomas Whitecross Hogarth, which occurred on August 14, 1945, at Surrey Hills, Victoria.

JOHN WYNDHAM MORGAN.

WE regret to announce the death of Dr. John Wyndham Morgan, which occurred on August 13, 1945, at Castlemaine, Victoria.

FRANK GLYNN CONNOLLY.

WE regret to announce the death of Dr. Frank Glynn Connolly, which occurred on August 12, 1945, at Ascot, Queensland.

Naval, Military and Air Force.

CASUALTIES.

ACCORDING to the casualty list received on August 7, 1945, Captain A. H. Nash, A.A.M.C., Millswood, South Australia, previously reported placed on the "seriously ill" list, is now reported "removed from all lists".

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Lehmann, Douglas Keith, provisional registration, 1945 Univ. Sydney), Hornsby and District Hospital, Hornsby.

Arnold, Arthur William Porter, M.B., B.S., 1944 (Univ. Sydney), Lake Crescent, Teralba.

Fisher, Elizabeth Mary Maxwell, M.B., B.S., 1944 (Univ. Sydney), Parramatta District Hospital, Parramatta.

Rimmer, William David, provisional registration, 1945 (Univ. Sydney), Royal North Shore Hospital, St. Leonards.

Booth, Ian Stanley, M.B., B.S., 1940 (Univ. Sydney), Captain I. S. Booth, 2/6 A.G.H., A.I.F., Australia.

Corrigendum.

AN error has occurred in connexion with the paper entitled "Immersion Blast Injuries of the Abdomen", by C. Keating, which appeared in the issue of August 18, 1945, at page 207. The author's rank was given as surgeon commander; it should have been given as surgeon captain. We apologize to Surgeon Captain Keating for this mistake.

Medical Appointments.

Dr. Abraham Fryberg, Acting Deputy Director-General of Health and Medical Services, has been appointed chairman and member of the State Nutritional Advisory Board, Queensland.

Dr. R. G. Plummer and Dr. R. Greenlees have been appointed registrars and Dr. Naomi R. Ryan resident medical officer at the Royal Adelaide Hospital.

Dr. D. W. Shepherd has been appointed Officer of Health for that part of South Australia north of the district of the Local Board of Health for Hawker, up to and including Leigh Creek.

Dr. F. W. Fay has been appointed a member of the Medical Council of Tasmania in accordance with the provisions of the *Medical Act*, 1918.

Books Received.

"Diseases of the Nervous System", by F. M. R. Walshe, O.B.E., M.D., D.Sc., F.R.C.P. (London), Hon.D.Sc., Nat. University Ireland; Fourth Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 8½" × 5½", pp. 376, with many illustrations. Price: 15s. net.

"Bacteria in Relation to the Milk Supply: A Practical Guide for the Commercial Bacteriologist", by C. H. Chalmers, B.Sc. (Edinburgh), N.D.A.; Third Edition; 1945. London: Edward Arnold and Company. 7¼" × 4¾", pp. 279, with many illustrations. Price: 8s. 6d. net.

"Cleft Palate and Speech", by Muriel E. Morley, B.Sc., F.C.S.T.; 1945. Edinburgh: E. and S. Livingstone Limited. 7¼" × 4¾", pp. 172, with many illustrations. Price: 7s. 6d. net.

"Textbook of Medicine", by Various Authors, edited by J. J. Conybeare, M.C., D.M. (Oxon.), F.R.C.P.; Seventh Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 8½" × 5½", pp. 1184, with many illustrations and X-ray plates. Price: 30s. net.

"Acute Injuries of the Head: Their Diagnosis, Treatment, Complications and Sequels", by G. F. Rowbotham, B.Sc. (Manchester), F.R.C.S. (England); Second Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 9¾" × 6¾", pp. 440, with many illustrations, some in colour. Price: 30s. net.

"The Elements of Medical Treatment", by Sir Robert Hutchison, Bart., M.D., D.Sc., LL.D., F.R.C.P.; Fourth Edition; 1945. Bristol: John Wright and Sons Limited. 7¼" × 4¾", pp. 224. Price: 10s. 6d. net.

"Rebel without a Cause: The Hypnoanalysis of a Criminal Psychopath", by Robert M. Lindner, Ph.D., with an introduction by Sheldon Glueck, LL.B., Ph.D., and Eleanor T. Glueck, Ed.D.; 1945. London: Research Books, Limited. 8¾" × 5½", pp. 271. Price: 21s. net.

"Manual of Psychological Medicine: For Practitioners and Students", by A. F. Tredgold, M.D., F.R.C.P., F.R.S.E.; Second Edition; 1945. London: Baillière, Tindall and Cox. 8½" × 5½", pp. 319. Price: 18s. net.

"The Little Company", by Eleanor Dark; 1945. Sydney: Collins Brothers and Company Limited. 8½" × 5¼", pp. 327.

"The Essentials of Chiropody", by Charles A. Pratt, Member of the Chartered Society of Physiotherapy; 1945. London: H. K. Lewis and Company Limited. 7¼" × 4¾", pp. 168, with 34 illustrations. Price: 10s. net.

"A Handbook on Diseases of Children: Including Dietetics and the Common Fevers", by Bruce Williamson, M.D., F.R.C.P. (London); Fourth Edition; 1945. Edinburgh: E. and S. Livingstone Limited. 7¼" × 4¾", pp. 400, with many illustrations. Price: 12s. 6d. net.

"The Bacterial Cell: In its Relation to Problems of Virulence, Immunity and Chemotherapy", by René J. Dubos, with an addendum by C. F. Robinow, Cambridge. Massachusetts: Harvard University Press. 8¼" × 5¼", pp. 480. Price: $5.00.

"The Treatment of Acute Intestinal Obstruction", by Judson T. Chesterman, M.R.C.P. (London), F.R.C.S. (England), F.A.C.S.; 1945. London: J. and A. Churchill Limited. 8½" × 5¼", pp. 124. Price: 10s. 6d.

"Nutritive Values of Wartime Foods" (tables compiled for the Accessory Food Factors Committee), Medical Research Council War Memorandum Number 14; 1945. London: His Majesty's Stationery Office. 9½" × 6", pp. 60. Price: 1s.

Diary for the Month.

AUG. 28.—New South Wales Branch, B.M.A.: Ethics Committee.
AUG. 30.—New South Wales Branch, B.M.A.: Branch Meeting.
SEPT. 4.—New South Wales Branch, B.M.A.: Organization and Science Committee.
SEPT. 5.—Western Australian Branch, B.M.A.: Council Meeting.
SEPT. 5.—Victorian Branch, B.M.A.: Branch Meeting.
SEPT. 6.—New South Wales Branch, B.M.A.: Special Groups Committee.
SEPT. 6.—South Australian Branch, B.M.A.: Council Meeting.
SEPT. 7.—Queensland Branch, B.M.A.: Branch Meeting (Jackson Lecture).
SEPT. 11.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
SEPT. 11.—Tasmanian Branch, B.M.A.: Ordinary Meeting.
SEPT. 14.—Queensland Branch, B.M.A.: Council Meeting.
SEPT. 17.—Victorian Branch, B.M.A.: Hospital Subcommittee.
SEPT. 17.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
SEPT. 18.—Victorian Branch, B.M.A.: Organization Subcommittee.
SEPT. 18.—New South Wales Branch, B.M.A.: Medical Politics Committee.
SEPT. 19.—Western Australian Branch, B.M.A.: General Meeting.
SEPT. 20.—South Australian Branch, B.M.A.: Council Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

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